CHANGING FAMILY RELATIONSHIPS, PERINATAL DEPRESSION, AND CHILD DEVELOPMENT IN TURKEY

Senturk, Vesile

Awarding institution:
King's College London

CHANGING FAMILY RELATIONSHIPS, PERINATAL DEPRESSION, AND CHILD DEVELOPMENT IN TURKEY

PHILISOPHY DOCTORATE IN
PSYCHIATRIC EPIDEMIOLOGY

Institute of Psychiatry, KCL

VESILE SENTURK

ABSTRACT

Background

Perinatal depression is important not only for women affected but also potentially for their children and families. However, the incidence, persistence and impact of depression and its risk factors throughout the perinatal period are poorly understood outside Western settings: particularly the relationship with social support in traditional and nuclear family structures and the impact on child development.

Aims

Through a prospective study of perinatal depression carried out in Ankara, Turkey, the candidate sought to estimate prevalence incidence and persistence of depression between antenatal and postnatal periods and associations with social support, and to investigate the effect of perinatal depression on changes in social support and child development

Method

A community sample of 730 women were recruited in their third trimester and followed up at 2 months, 12 months and 18 months after birth. Depressive symptoms were ascertained using the Edinburgh Postnatal Depression Scale, social support (relationship quality) with the Close Persons Questionnaire applied to relationships with the husband, mother and mother-in-law, and child development with the Guide for Monitoring Child Development (GMCD). Traditional and nuclear family settings were compared.

Results

Prevalence of antenatal depression was 33.1%, incidence at 2 months after birth was 13.9%, and persistence of depression between these two points was 49.7%. Lower social support, particularly that from the husband and mother-in-law was strongly associated with antenatal depression. While some predictive associations were found for this

exposure with incidence and persistence of depression to the post-natal period, more consistent and stronger associations were found between antenatal depression and a subsequent exaggerated decline in social support over all four examinations. No associations were found between perinatal depression and child development.

Conclusion

Perinatal depression was common in this population and a predictor of declining quality in key relationships. However, no adverse effects were found of depression on child development.

CONTENTS

Tables

List of abbreviations

AND Antenatal Depression

BDI Beck Depression Inventory;

BDQ Brief Disability Questionnaire

BSID Bayley Scale of Infant Development

CBCL Child Behaviour Checklist

CES-D Centre for Epidemiological Studies Depression Scale

CHQ Childbearing Health Questionnaire

CI confidence interval

CIS Clinical Interview Schedule

CIS–R Clinical Interview Schedule-Revised

EPDS Edinburgh Postnatal Depression Scale

GHQ General Health Questionnaire

HADS-D Hospital Anxiety and Depression Scale–Depression

HSCL Hopkins Symptom Checklist;

IQ Intelligence Quotitent

ITSEA Infant-Toddler Social and Emotional Assessment

MDI mental index of BSID

NBAS Neonatal Behavioural Assessment Scale

NPI Neonatal Perception Inventory

OR Odds Ratio

PDI Psychomotor Development Index of Bayley Scales of Infant Development (BSID)

PDPI-R Predictors of Postpartum Depression Inventory – Revised

PND Postnatal Depression

PoMS Profile of Mood States

PPVT Peabody Picture Vocabulary Test

PRIME-MD Primary Care Evaluation of Mental Disorders

PSS Perceived Stress Scale

SADS Schedule for Affective Disorders and Schizophrenia

SADS-L Schedule for Affective Disorders and Schizophrenia-the Lifetime version

SAPAS Standardised Assessment of Personality— Abbreviated Scale

SCAN Schedules for Clinical Assessment in Neuropsychiatry

SCID Structured Clinical Interview for DSM-III-R

SCID Structured Clinical Interview for DSM-IV

SCID-I NP Structured Clinical Interview for *DSM-IV* Axis I Disorders Non-Patient Edition

SCID-II Structured Clinical Interview for *DSM-IV* Personality Disorders

SPI Standardized Psychiatric Interview

SRQ–20 Self-Reporting Questionnaire

SS + TR Sum of subscapular and triceps skinfold thickness

STAI State-Trait Anxiety Inventory

WISC-III Wechsler Intelligence Scale for Children- Revised

WRAVMA Wide Range Achievement of Visual Motor Abilities

YSL Youth self report

Charts

Chart 1 Follow-up chart

ACKNOWLEDGEMENTS

I grateful to Robert Stewart my supervisor at the Institute of Psychiatry and Professor Oguz Berksun my supervisor in Ankara University Faculty of Medicine for a wealth of experienced advice and support during long periods of conducting research, data collection, analysis and writing my thesis. Both my supervisors were really supportive during this period and they designed and obtained funding for the cohort study which I have been allowed to work on and make my own. I am also grateful to Professor Abdulkadir Cevik who allowed me to carry out this project to Professor Martin Prince who gave valuable feedback.

Research assistants Zeynep, Sebahat, Gokce and Emel took a more than equal part in collecting data and I am very thankful for their help, perseverance and patience over 30 months. Thanks are also to other research assistants who took place in some part of data collection.

Others who helped with the study and to whom I extend thanks are Professor Michael Dewey who thought me statistics and Melanie Abas who supported me as my second supervisor.

I am also grateful to The Ministry of Health in Turkey which allowed me to carry out this study in mother and child centres.

Last but not leas I am grateful to my Psychiatry section in Ankara University and Section of Epidemiology in the IoP, parents and family.

The study on which this thesis is based was funded by a Masters Fellowship and Prize Studentship from the Wellcome Trust. The full-time MSc course in Psychiatric Research at the Institute of Psychiatry, KCL, funded through this Fellowship, was particularly valuable in enabling me to be self-sufficient in the statistical analysis of the study described in this thesis. I am also however indebted to Robert and Oguz for supervision and and advice in this respect.

This thesis dedicated to memories of my father.

The study was carried out in collaboration with the following mother and child unit teams to whom the author is very grateful:

My contribution to the study

The study was conceived by myself, Robert Stewart and Oguz Berksun with initial funding obtained through a Masters Fellowship from the Wellcome Trust which supported my career development through the MSc in Psychiatric Research at the Institute of Psychiatry, King's College London followed by 18 months research support during which the first two waves of this study were carried out. I was then successful in obtaining a Prize Studentship from the Wellcome Trust which extended the research period to 36 months and supported my PhD programme. I had input into the design of the study from the planning stage onwards and the measurements used, I was responsible for negotiating collaboration with the mother and child units, and other centres and for coordination of fieldwork. Fieldwork, which I supervised throughout, commenced in December 2007 and continued till July 2010. Recruitment and follow-up of participants through face to face, telephone and doorstep contact was shared between me and my co-workers. I carried out the statistical analysis of the data, liaising with my supervisors through regular project meetings. I prepared initial drafts of all research papers arising from the study with contributions from co-authors who all saw and approved final manuscripts.

Other people who advised on and contributed to this project are mentioned under the Acknowledgments heading above.

Ethical approval

The protocol for the study was approved by the King's College London Research Ethics Committee and Ankara University Faculty of Medicine Research Ethics Committee. Copies of correspondence are included on the following pages.

CHAPTER A
PERINATAL DEPRESSION and CHILD DEVELOPMENT

CHAPTER A.1 Introduction

Common mental disorders (CMDs) are two to three times more common in women than in men (Patel et al 1999) and are particularly common among women of childbearing age (Kumar 1994). Postnatal (PND) and antenatal (AND) depression are the most common mental disorders in the maternal period. Postnatal depression is a complex mix of physical, emotional, and behavioural changes that occur after giving birth that are attributed to the genetic, social, and psychological changes associated with having a baby (Halbreich 2005). The Diagnostic and Statistical Manual of Mental Disorders 4th Edition: Text Revised (DSM-IV TR) views PND as major depression with a postpartum onset occurring within approximately 4 weeks of delivery (APA 2000). Symptoms include anhedonia, dysphoria, hopelessness, worthlessness, anxiety, and inability to sleep while the infant is asleep, poor concentration, appetite disturbances, guilt, and suicidal thoughts. To meet criteria for major depression, depressed mood or loss of interest or pleasure in activities must be present for at least 2 weeks. However, there is considerable heterogeneity in the construct since perinatal depression may start in the antenatal period or may have an onset after the first postpartum month. Furthermore, there is no general agreement on the exact length of the period that should be termed 'postnatal'. In the review of the background literature, perinatal depression is taken to encompass both major and minor depressive episodes that occur either during pregnancy or within the first 12 months following delivery.

Several risk factors related to antenatal and postnatal depression have been reported. These include psychosocial and biological factors. Psychosocial risk factors have been evaluated extensively in the literature (O'Hara and Swain 1996, Beck 2001, Lancaster et

al., 2010) and biologic risk factors have been investigated in a number of recent studies. Several mechanisms have been proposed for the pathophysiology of perinatal depression, including disturbances of the hypothalamic-pituitary-adrenal (HPA) axis and a more general role of cortisol (King et al. 2010; Meltzer-Brody 2011). However, findings in these respects have been contradictory (Okun et al. 2011). Other hormones have also been hypothesized to be mechanistically involved, including progesterone, oestradiol and oestriol, prolactin, thyroid-stimulating hormone, and triiodothyronine/thyroxine (Dennis et al 2008; Brummelte and Galea 2010; Basraon and Constantine 2011). However, no consistent associations have been found between changes in hormonal levels and the peak incidence of depression during or after pregnancy. A large proportion of research into the pathophysiology of depression more generally has focused on the monoamine neurotransmitters serotonin, norepinephrine, and dopamine, a review by Nemeroff (2002) reporting decreased or altered levels and activity of the three monoamine systems in the brains of people with depression. Although an association between the monoamine systems and perinatal depression is plausible, direct evidence in pregnancy or the postnatal period is limited (Nemeroff 2008).

Although several risk factors for perinatal depression have been established, population-level risk remains substantially unexplained. Social roles for women and family support structures differ between cultures and are likely to be important factors in the aetiology of this condition, possibly particularly in settings where these are rapidly changing. Although several studies have investigated associations between the quality of the marital relationship and perinatal depression, there has been very little formal evaluation of wider family networks. In Turkey, as in many settings, mothers and mothers-in-law

are traditionally expected to provide both practical and emotional support for women around childbirth. The social transitions that are currently occurring in Turkey and elsewhere can place considerable strain on these relationships – but the potential impacts on perinatal depression have yet to be clarified, as has a potential reciprocal impact of perinatal depression on the quality of these relationships.

Perinatal depression is an important public mental health issue in both developing and developed nations. Depression during the perinatal period can have important adverse consequences, not only for the women experiencing it but also for the women's children and family (Marmorstein et al., 2004). In recent decades, researchers have begun to focus more intensely on the potential effects of perinatal maternal mental illness on the developing child. Prospective studies that begin during pregnancy and follow the mothers and children into adolescence have suggested that maternal mental illness during the antenatal and postpartum period can have long lasting negative consequences. The effects of depression during pregnancy and the postpartum on child outcomes have been widely studied, although the findings from these studies have not been consistent (Brand and Brennan 2009).

In this study we investigated prevalence and incidence of perinatal depression, relationships with psychosocial risk factors namely social support (in particular perceived quality of key relationships) and family structure and associations between perinatal depression and child development in Turkey. The study itself comprised recruitment of women during the third trimester of pregnancy with subsequent follow-up interviews at around 2, 12 and 18 months postpartum. Regarding the literature review in this thesis, the focus was therefore on prospective studies of perinatal mental

disorder and its aetiology, studies of relationships between this and child development, and previous research into perinatal mental health in Turkey. In order to evaluate the background literature, the following key words were used as search terms in different combinations: “antenatal depression”, “prenatal depression”, “postnatal depression”, “postpartum depression”, “screening”, “pregnancy”, “incidence”, “prevalence”, “perinatal depression”, “cohort study”, “prospective study”, “child development”, “risk factors”, “social support”, and “Turkey”. Articles and abstracts were retrieved and considered from January 1980 through August 2011 using the following databases: PubMed, CINAHL, SCOPUS, PsycINFO, Sociological Abstracts, and ISI Proceedings. The following were excluded: studies that provided only descriptive statistics, studies in a non-English and non-Turkish language, studies with an exclusively adolescent sample, studies of women with known depression at the time of screening, and case series or case reports. In structuring the literature review, postnatal depression is considered before antenatal depression because of the larger volume of research evidence concerning the former. Prevalence studies of each are considered first, followed by risk factor research before considering social support as an exposure in more detail and finally summarising research to date on perinatal depression in Turkey.

.

CHAPTER A.2 Prevalence of postnatal depression in international research

Postnatal depression (PND) is a major health issue for many women from diverse cultures and its prevalence has received extensive previous research (Affonso et al., 2000, Oates et al., 2004, Almond 2009). Current diagnostic criteria for mental health disorders do not include PND as a distinct diagnosis (DSM-IV TR 2000). A useful and pragmatic definition of PND provided by the Scottish Intercollegiate Guidelines Network defines PND as "any non-psychotic depressive illness of mild to moderate severity occurring during the first postnatal year" (Scottish Intercollegiate Guidelines Network (SIGN) 2002). The onset of major depression is believed to be markedly common in the postpartum period; researchers have found a 3-fold increase in the onset of major or minor depression in the first weeks postpartum compared to women of similar age, marital status, and parity but without recent childbirth (Gavin et al., 2005).

Due to the large volume of research on this subject, the literature review mainly focused on systematic reviews and recent prospective cohort studies. According to Mann et al (2010) a total of 696 citations and 476 unduplicated citations were found where the primary focus of the review topic or question was the prevalence or incidence of PND. Only one systematic review (Gavin et al. 2005) and four reviews of prevalence of PND (Halbreich and Karkun 2006; O'Hara and Swain 1996; Goodman 2004; Ross and Dennis 2009) were identified. Only two reviews provided an overall summary estimate of prevalence of PND (O'Hara and Swain 1996; Gavin et al. 2005). Another systematic review by Gaynes et al. (2005) from the same research group as Gavin et al. (2005) was not included in this overview by Mann et al. (2010) presumably because of the similar data represented.

Three reviews reported the prevalence estimates from each of the primary studies (Halbreich and Karkun 2006; Goodman 2004; Ross and Dennis 2009), but did not attempt a quantitative summary estimate of PND prevalence. The reviews did not provide any formal discussion as to the feasibility of combining the data or justification as to reasons why these data were not considered appropriate for data synthesis.

Gavin et al. (2005) conducted a meta-analysis of 28 primary studies of perinatal depression, 16 of which reported prevalence estimates solely in the postnatal period. Due to significant heterogeneity between primary studies, six studies were excluded as outliers and a revised meta-analysis was conducted to optimise the estimates. For both major and minor depression at three months postpartum, the combined 'best estimate' point and period prevalences since birth were 12.9% and 19.2% respectively. For major depression alone at three months postpartum, the combined 'best estimate' point and period prevalences since birth were 4.7% and 7.1% respectively.

Another systematic review by the same research group of depression diagnosed using a clinical structured interview concluded that the point prevalence of combined major and minor depression ranged from 6.5-12.9% in the first 6 months postpartum, peaking between 2 and 6 months period after delivery. For major depression alone, the final combined point prevalence estimates ranged from 1.0-5.9% at different times during the first postpartum year (Gaynes et al., 2005).

Although formal meta-analyses were conducted in the review by Gavin et al. (2005) the restrictive nature of the inclusion criteria (resulting in preferential exclusion of studies from poorer countries) was highlighted as providing sub-optimal generalisability to

populations outside of the USA and particularly in developing countries (Mann et al., 2010).

O'Hara and Swain (1996) investigated sources of variability in prevalence estimates between studies. The authors combined estimates from 59 studies in which depression had been assessed at least 2 weeks postpartum using either a clinical interview or a validated self-report measure with an established cut-off (i.e., Beck Depression Inventory; BDI ≥10; Edinburgh Postnatal Depression Scale; EPDS ≥13; Zung Depression Scale ≥48; Centre for Epidemiological Studies—Depression; CES-D scale ≥16). The authors estimated mean prevalence of PND from 59 primary studies by dividing the number of all women identified with PND by the total number of participants across the included primary studies. Based on a total derived sample of 12,810 postpartum women, they estimated the average prevalence of postpartum depression to be 13%. The estimated mean prevalence of PND identified via self-report measures (n=28 studies) as 14% and prevalence of PND identified via standardised clinical interview method (n=31 studies) as 12%. They found that self-report measures yielded significantly higher estimates of postpartum depression than interview-based methods and that longer evaluation periods resulted in higher estimates. The numbers of days postpartum when the depression assessment was made and the country in which the study was conducted did not significantly affect the prevalence estimates in their analysis.

A wider review of PND prevalence in 40 countries worldwide found a range from almost 0% to 74% (Halbreich and Karkun 2006), lowest prevalences being found in Singapore, Malta, Malaysia, Austria and Denmark and highest prevalences in Brazil, Guyana, Costa Rica, Italy, Chile, South Africa, Taiwan and Korea. The widely cited

mean prevalence of postnatal depression, 10–15%, therefore may not be representative of the actual global prevalence and magnitude of the problem, due to the wide range of reports.

Although PND prevalences in non-Western cultures and developing countries are often reported as higher than in Western countries – for example, reports of 37% in Chile (Jadresic and Araya 1995), and 23% in Goa, India (Patel et al., 2003) – a recent systematic review (Sawyer et al., 2010) found that depression was the most commonly assessed disorder with a weighted mean prevalence of 18.3% (95% CI 17.6%-19.1%) after birth in eight African countries. Thirty-five studies, with a total of 10,880 participants, were identified although the limitations were highlighted of cross-sectional data and varying measures of mental health (Sawyer et al., 2010). However, particularly high prevalences have tended to be found in Asian countries such as Israel 22.6% (Glasser et al., 2000), Taiwan 36.6% (Wang and Chen 2006) and, as will be described later, in Turkey 33,2% (Ege et al. 2008) In another review, a total of 64 studies from 17 Asian countries were reviewed, the prevalence of PND in Asian countries ranged from 3.5% to 63.3% with Malaysia and Pakistan having the lowest and highest prevalences, respectively (Klainin and Arthur 2009).

In the meta-analysis by Villegas et al (2010), PND and rural residence were considered specifically. Seventeen articles were eligible where a standardized assessment of depression had been administered to rural mothers within the first year postpartum. The overall prevalence of PND among rural women was 27.0% (95% CI, 18.8%-37.2%). Prevalence was somewhat higher among women in developing countries (31.3%; 95% CI, 21.3%-43.5%) than in developed countries (21.5%; 95% CI, 10.9%-38.0%).

As with other health outcomes, the reasons underlying international heterogeneity are potentially manifold. From a methodological perspective, differing samples needs some consideration, and variations in case definition even more so. In addition, there are the inherent difficulties of conducting cross-cultural research (Sawyer et al. 2010). If at least some variation can be assumed to be genuine, however, explanations need to focus on differences in underlying risk profiles as well as considering the extent to which these account for differences in onset or maintenance of case-level syndromes.

Although there have been many individual studies of PND prevalence, a recent overview (Mann et al 2010) concluded that the literature remained lacking with regard to adequate reviews of prevalence. In particular, this overview suggested that current knowledge of prevalence of PND is limited due to issues of methodological quality and a lack of high-quality systematic reviews in this area.

CHAPTER A.3 Prevalence of antenatal depression in international research

Perinatal depression has received most attention to date where it is detected in the postnatal period – i.e. defined as postnatal depression, even though the onset may not be known. However, depression is one of the most common complications in pregnancy and it has been suggested that a large proportion of 'postnatal' depression arise in the antenatal period (Patel et al. 2002), and several professional organizations recommend routine screening for antenatal depression (Pignone et al 2002, US Preventive Services 2002). There are three systematic reviews on the prevalence of antenatal depression (AND)—one focusing specifically on the pregnancy and the others on the wider perinatal period (Bennet 2004, Gaynes et al. 2005, Gavin et al. 2005).

Bennett et al. (2004) conducted a meta-analysis of prevalence estimates for depression specifically during pregnancy, considering findings from 21 studies meeting predetermined inclusion criteria, including the assessment of depression by a structured clinical interview, the Beck Depression Inventory (BDI), or the Edinburgh Postnatal Depression Scale (EPDS). Based on a combined derived sample of 19,284 pregnant women, they estimated the prevalence of depression to be 7.4% during the first trimester, 12.8% during the second trimester, and 12.0% during the third trimester. The 95% confidence intervals for these estimates overlapped substantially and minimal variation by trimester was concluded. The authors also found that, compared with structured clinical interviews, the self-report Beck Depression Inventory (BDI) produced significantly higher prevalence estimates, whereas the self-report Edinburgh Postnatal Depression Scale (EPDS) produced statistically equivalent estimates using standard cut-offs to define caseness (Bennet et al., 2004).

The meta-analysis by Gaynes et al (2005) concluded that the point prevalence of major and minor depression ranged from 8.5% to 11.0% at different times during pregnancy, and the point prevalence of major depression ranged from 3.1% to 4.9%. It was suggested that the prevalence of depression during pregnancy was similar to that during the postnatal period.

Summaries of studies that have estimated the prevalence of depression in pregnancy are presented in Table A. 4. Considering the origins of the studies, the 13 US estimates range from 11-51% with a substantial range of 16-50% even in large studies using an identical scale and cut-off (CES-D ≥16). The three UK studies have a more consistent range although show no clear relationship between the position of the EPDS cut-off and the observed prevalence, suggesting that heterogeneity would have been higher if the same cut-off had been used. Of the other countries represented, highest prevalences were reported from the lower income environments of Brazil and Tanzania, although heterogeneity was substantial in the remainder.

Table A.1. Summary of studies that have estimated the prevalence of depression in the antenatal period

Author, year	Country	Sample size	Instrument (cut-off point)	Depression prevalence (%)
Da Silva et al., 1998	Brazil	32	EPDS (>13)	38
Da Costa et al., 2000	Canada	100	DACL (≥14)	31
Seguin et al., 1995	Canada	55	BDI (≥15)	20
			BDI (≥10)	34
Verdoux et., al. 2002	France	598	EPDS (>12)	5
Dayan et al., 2006	France	641	EPDS (≥14)	15
Pajulo et al., 2001	Finland	391	EPDS (>12)	8
Kurki et al., 2000	Finland	623	BDI (≥13)	30
Chung et al., 2001	Hong Kong	959	BDI (>14.5)	10
Berle et al., 2005	Norway	680	HADS-D (≥8)	3
Rahman et al., 2004	Pakistan	265	SCAN	25
Salamero et al., 1994	Spain	976	BDI (>10)	35
Andersson et al., 2004	Sweden	1795	PRIME-MD, PHQ (na)	11
Josefsson et al., 2001	Sweden	1 489	EPDS (>10)	17
Kaaya et al., 2010	Tanzania	787	HSCL	40
Bolton et al., 1998	UK	492	EPDS (>15)	24
Johanson et al., 2000	UK	417	EPDS (>14)	10
Evans et al., 2007	UK	12059	EPDS (>12)	14
Birndorf et al., 2001	US	69	BDI (≥10)	25
Dayan et al., 2002	US	767	EPDS (≥15)	11
Hoffman and Hatch 2000	US	876	CES-D (≥16)	31
Kelly et al., 2001	US	186	PRIME-MD, PHQ (na)	21
Marcus et al.,	US	3472	CES-D (≥16)	20

2003				
McKee et al., 2001	US	114	BDI-II (≥14)	51
O'Heron 2000	US	108	SCID-I	14
Orr and Miller 1995	US	2 000	CES-D (≥16)	50
Wu et al., 2002	US	3 873	CES-D (≥16)	16
Field et al., 2010	US	911	SCID	20
Gavin et al., 2009	US	3019	CES-D	17
Jesse et al., 2003	US	119	2-item Screen	50
Li et al., 2008	US	791	CES-D(≥16)	41

BDI Beck Depression Inventory
CES- Center for Epidemiologic Studies Depression scale
CI confidence interval
DACL Depression Adjective Check List
EPDS Edinburgh Depression Scale
GHQ General Health Questionnaire
HADS-D Hospital Anxiety and Depression Scale–Depression
HSCL Hopkins Symptom Checklist
PRIME-MD Primary Care Evaluation of Mental Disorders
SCAN Schedules for Clinical Assessment in Neuropsychiatry
SCID Structured Clinical Interview for DSM-IV

CHAPTER A.4 The incidence and persistence of perinatal depression

There have been few estimates of the incidence of perinatal depression—the percentage of women with depressive episodes that begin during pregnancy or in the first year postpartum. Moreover, literature on the persistence of perinatal depression is also scarce (i.e. the continuation or not of depressive episodes during the perinatal period – for example, from pregnancy to postpartum). Incidence studies are summarised in Table A.2 and key findings on incidence and persistence will be further considered in detail in this chapter.

In an early study in the UK by Cooper et al., (1988), the psychiatric state of 483 women was examined antenatally and at 3, 6, and 12 months postpartum, using the General Health Questionnaire, the Present State Examination and the Montgomery and Asberg Depression Rating Scale. In a subgroup of the full sample, the incidence of psychiatric disorder in the year following delivery was estimated to be 15.1%, which is close to a figure previously reported for women in the community. The onset of psychiatric disturbance was soon after delivery in most instances; and, for the majority, the episode of disturbance lasted for 3 months or less.

The systematic review by Gaynes et al. (2005) reported that thirteen studies provided estimates of the incidence of the disorder which ranged between 2.2% and 14.5% over the antenatal period, and were 6.8%, 9.8%, and 20.1% in three studies covering the postnatal period. The same research group reported similar incidence rates in another review by Gavin et al (2005) where nine articles were included. These data suggest that as many as 14.5% of pregnant women have a new episode of major or minor depression

during pregnancy (from four studies included), and 14.5% have a new episode during the first three postnatal months (from five studies included) (Gavin et al 2005). Considering only major depression, 7.5% were estimated as having a new episode during pregnancy, with 6.5% having a new episode in the first 3 months postpartum (Gavin et al 2005). In this review, there was one study (Areias et al., 1996) which reported the incidence of depression at any point from birth to 12 months afterwards postnatal which was found to be 49.0% (Gavin et al 2005). The estimations of incidence were lower than those found in prior studies for two reasons. First, studies that assessed depression based on self-report screens alone, which have been found to give high prevalence estimates, were excluded. Second, recent studies that use more precise criteria to identify major depression were mainly included.

In a recent study from Italy (Banti et al., 2011), in which depression was evaluated by self report (EPDS > 12) and structured clinical interviews, the incidence of depression was 2.2% and 6.8% in antenatal and postnatal period respectively. These results were in line with systematic review by Gaynes et al. (2005). However there are several limitations in this study such as moderately low response rate (49.9%) (Banti et al., 2011).

One of the largest investigation of this question was conducted in the UK, using data from the Avon Longitudinal Study of Parents and Children (ALSPAC), a longitudinal, prospective study of all pregnant women who were living in Avon, England, their partners and an index child (Golding et al., 2001, Evans et al., 2001, Heron et al., 2004 and Deave et al., 2008). The study included women who were to deliver their baby between 1 April 1991 and 31 December 1992. Almost 15,000 women were recruited

and it was estimated that 85–90% of the eligible population took part in this study All data were collected via postal questionnaires and pregnant women were followed up with the EPDS at 18 and 32 weeks of pregnancy and 8 weeks and 8 months postpartum as part of the ALSPAC programme (Evans et al., 2001). Depression scores were higher at 32 weeks of pregnancy than 8 weeks postpartum, although there were no overall differences in the distribution of total scores or scores for individual items at the four time points. In the sample, 13.5% scored above threshold for probable depression at 32 weeks of pregnancy, 9.1% at 8 weeks postpartum, and 1.6% at all four time examinations. More mothers moved above the threshold for depression between 18 weeks and 32 weeks of pregnancy than between 32 weeks of pregnancy and 8 weeks postpartum. Symptoms of depression were not more common or severe after childbirth than during pregnancy.

The same study group reported longitudinal patterns of depression from the same study sample in another article by Heron et al., (2004). In this analysis, the stability of depression across the four measurement points (covering an approximately 1.5 year period) was moderate, and the correlations were stronger between examinations at 18 and 32 weeks of gestation than between examinations at 18 weeks gestation and 8 months postpartum. There was no elevation in depression scores in most women (75.5%). At the 8 week postpartum assessment, 8.9% of women scored above EPDS cut-off, but the incidence rate for this category was only 3.5%. Summing across the 8-week and 8-month postnatal assessments, 13.3% of the sample scored above the 12 on the EPDS on at least one postnatal assessment. Of these, antenatal depression was not apparent in almost half (43.7%). Of the total sample, 11.2% reported elevated depression in the antenatal period only.

Deave et al. (2008) reported prevalence and persistence of antenatal depression where complete antenatal EPDS data (18 and 32 weeks of gestation) were available for 11,098 women from ALSPAC study. Using the standard 12/13 cut-off, 74.4% were not depressed during the perinatal period, 14.1% were depressed on at least one assessment antenatally but at neither postnatally, 4.8% were depressed on at least one of the two examinations postnatally but at neither antenatally, and only 1.4% were persistently depressed antenatally and postnatally.

British and Swedish studies have reported similar maintenance rates (37-46%) and incidence rates (5-7%) of depression from the antenatal to postnatal periods (Evans et al 2001, Heron et al 2004, Rubertsson et al 2005, Deave et al 2008). Rubertsson et al., (2005) studied with 2430 Swedish women attending their first antenatal care visit during three predestined weeks. Depressive symptoms were evaluated in early pregnancy, and at two months and one year postpartum. Of those women who scored high (≥12) on the EPDS during pregnancy, about one out of three (37%) also scored at case level two months postpartum and of case-level women two months postpartum, almost half of them (46%) remained case level at twelve months. Three per cent of all the cohort scored at case level on all three assessments, 6% twice and 17% on one of the three assessments. In all, one out of four (26%) scored at case level on at least one of the assessments.

A follow-up study of an Australian cohort from early pregnancy till five years after birth suggested that in the majority of women who experienced depressed mood after birth, the symptoms were not severe and did not continue beyond a few weeks (Najman et al.,

2000). In an early prospective study from USA, O'Hara et al. (1984) followed up 99 women from second trimester of pregnancy to 6 months after giving birth, and found that although almost one half of the subjects had depressive scores that would place them in the mildly depressed range during the second trimester, less than 12% of the subjects were in the mildly depressed range at the 9-week and 6-month follow-ups. In another American study, Campbell and John (1997) followed up 70 women meeting the criteria for clinical depression at 2 months postnatal and found that at 4 months postnatal, 48% continued to be depressed; at 6 months 30% and at 12 months, 24% continued to meet the criteria for depression. In another US study, Beeghly et al. (2002) evaluated stability and change in the level of maternal depressive symptomatology over the course of the first postnatal year in a community cohort of 106 first-time mothers of full-term, healthy infants. At 2 months postpartum (intake), mothers were classified into one of two symptom groups on the basis of their total score on the Center for Epidemiological Studies–Depression Scale (CES-D): high or normative. Mothers completed the CES-D again at 3, 6, and 12 months postpartum. Of women with high depression scores at 2 months postpartum 35% and 31% remained depressed at 6 and 12 months respectively.

Similar studies from developing countries have reported high persistence rates for postnatal depression. A recent prospective cohort study conducted in Iran where 1291 women in their third trimester (with depression ascertained by a BDI >20 score) were followed up to 6-8 weeks postpartum (with depression ascertained from the EPDS). Incidence of postnatal depression over this period was 20.1%, and persistence of depression 49.6% (Kheirabadi and Maracy 2010). In a recent study from Ethiopia, Hanlon et al., (2010) recruited 1065 women in pregnancy and followed up them to 2

months postpartum. The sample was assessed for postnatal common mental disorders (CMD) with the Self-Reporting Questionnaire (SRQ–20). Prevalent postnatal CMD (SRQ ≥6) was found in 4.6%, with new onset from the antenatal examination in 2.4%, and persistence in 21.4%. In a study from Pakistan by Rahman and Creed (2007) of 701 women, the Schedule for Clinical Assessment in Neuropsychiatry (SCAN) was used to identify depression in the third trimester of pregnancy, and depressed women were re-assessed at 3, 6 and 12 months postpartum. Of the 129 depressed women completing the one-year follow-up, 121 (94%) were depressed at 3 months, 98 (76%) at 6 months and 80 (62%) at 12 months. Of those depressed during the third trimester of pregnancy (62%) were still depressed at 12 months postpartum but fewer (57%) were depressed at all time points. Chandran et al. (2002) investigated incidence of postnatal depression in India, following 359 women in the last trimester of pregnancy to 6-12 weeks after delivery with the revised Clinical Interview Schedule (CIS–R) to assess CMD. In this cohort of pregnant women, 11% developed depression in the first 3 months after childbirth, antenatal depression identifying more than half of the women with postnatal depression.

Table A.2 Summary of cohort studies that have estimated the incidence of depression in perinatal period

First author, year	Country	Sample size	Depression measure	% depression incidence (follow-up period)			
				Antenatal		Postnatal	
Matthey et al., 2000	Australia	166	BDI EPDS			27.3	Birth-12m
Gotlib, 1989	Canada	295	SADS	2.2	T2-T3	7.8	Birth-1m
Hanlon, 2010	Ethiopia	1065	SRQ-20			2.4	Birth-2m
Lee, 2001	Hong Kong	145	SCID			7.8	Birth-1m
						14.5	Birth-3m
Chandran, 2002	India/Tamil	359	CIS-R			11.1	Birth-3m
Kheirabadi and Maracy, 2010	Iran	1821	EPDS			20.1	6-8w
Banti, 2011	Italy		EPDS SCID	2.2	T2–birth	6.8	Birth-12m
Kitamura et al., 1993	Japan	120	SADS	11.3	T0-T1		
				14.5	T0-birth		
Yamashita et al., 2000	Japan	88	SADS			7.8	Birth-1m
						14.5	Birth-3m
Areias, 1996	Portugal	54	SADS	5.8	T0-T2	14.5	Birth-3m
				14.5	T0-birth	49.0	Birth-12m
Rubertsson et al., 2005	Sweeden						
Cooper et al., 1988	UK	483	PSE			15.1	Birth-1m
Cox et al, 1993	UK	105	SPI			11.1	Birth-6m
Deave et al., 2008	UK	11098	EPDS			4.8	Birth-8m
Evans et al., 2001	UK	13799	EPDS	8.4	18-32w	5.3	Birth-8w
Heron et al., 2004	UK	8323	EPDS	-		3.5	Birth-8w
Kumar and Robson, 1984	UK	196	SPI	11.3	T0-T1	14.5	Birth-3m
				2.7	T1-T2		
				2.2	T2-T3		
Watson et al., 1984	UK	128	SPI	7.5	T0-birth	8.1	Birth-2m

Yoshida et al, 1997	UK	98	SADS	14.5	Birth-3m
Chaudron et al., 2001	US	465	CES-D	5.8	Birth-4m
Hobfoll et al, 1995	US	192	SADS	12.5	T2-2m
O`Hara et al., 1984	US	99	SADS	10.3	Birth-2m

T: trimester (T0=conception), w=weeks, m=months
CES-D Center for Epidemiologic Studies Depression Scale
CIS–R Clinical Interview Schedule
EPDS Edinburgh Postnatal Depression Scale
SADS Schedule for Affective Disorders and Schizophrenia
SCID Structured Clinical Interview for DSM-III-R
SPI Standardized Psychiatric Interview
SRQ–20 Self-Reporting Questionnaire
SCAN Schedule for Clinical Assessment in Neuropsychiatry

CHAPTER A.5 Risk factors for postnatal depression

Extensive research into the aetiology of postnatal depression has suggested multiple contributory factors. Epidemiological research and meta-analyses, however, have consistently identified the importance of psychosocial and psychological risk factors (Beck 2001), such as life stress (O'Hara and Swain 1996) marital conflict, maternal self esteem, and lack of social support (Dennis 2005). The literature search for this thesis identified three meta-analyses of risk factors for postnatal depression conducted by O'Hara and Swain (1996), Beck (2001) (an update of a previous meta-analysis by Beck (1996)), and Robertson et al. (2004). The reports by O'Hara and Swain (1996) and Beck (1996) incorporated results from over 70 studies, and 12,000 research subjects whereas the results of the more recent studies of nearly 10,000 additional subjects were analyzed in that carried out by Robertson et al., (2004). This section aims to summarise the key areas of concordance and heterogeneity in previous international research. Because of their particular relevance to this thesis, social support measures (including marital relationship quality) as exposures will be considered more specifically at a later point.

Socioeconomic status

Socioeconomic deprivation indicators such as unemployment, low income, and low education have been cited as risk factors in mental disorders, and depression in particular in community populations (Patel et al 1999). Indicators such as low income, financial strain, unemployment, and lower social status have also been found to have small but significant associations with high levels of postnatal depressive symptomatology, results which have been found to be reasonably consistent across different cultures and countries (O'Hara and Swain 1996, Patel et al., 2002).

Adverse life events

The relationship between life events and the onset of depression is well established in the wider epidemiological literature on unselected community samples. Experiences captured in commonly applied inventories include events such as bereavement, serious health problems in participants or a close other, relationship breakdown or divorce, losing a job, or moving house. However, while studies undertaken in Britain and North America have found strong associations between postnatal depression and recent life events, those carried out in Asian samples have resulted in weaker or absent associations (Lee et al. 2000), the reasons for which remain unclear.

Personal and family history of psychiatric illness

Depressed mood or anxiety during pregnancy have consistently been found to be significant predictors of postnatal depression, as have previous depressive symptoms at any time, not just those related to childbirth (O'Hara and Swain. 1996, Beck 2001, Robertson et al., 2004). The current evidence from large-scale studies suggests that having a positive family history of any psychiatric illness confers risk of postnatal depression although there is no information on this association in meta-analyses. This association has also been found consistently in studies that have been able to report completed clinical interviews with women suffering from postnatal depression and members of their family (Steiner 2002).

Other psychological factors

Maternal personality characteristics including neuroticism and cognitive attribution style have been investigated as risk factors for postnatal depression. Neuroticism measured in

women antenatally was found to be a weak-to-moderate predictor of postnatal depression (O'Hara and Swain 1996, Lee et al., 2000). Similarly, women with negative cognitive attribution styles (e.g., pessimism, anger, ruminations) were more likely to have postnatal depression (O'Hara and Swain 1996).

Obstetric factors

A range of obstetric factors and experiences of childbirth have been investigated in relation to postnatal depression. Measures have included pregnancy complications such as preeclampsia and hyperemesis, as well as delivery-related complications such as caesarean section, instrumental delivery, premature labour, and excessive bleeding. Reviewed findings have indicated that pregnancy- and delivery-related complications have small but significant effects on the development of postnatal depression (O'Hara and Swain 1996, Warner 1996, Forman 2000). However, equivocal findings have been reported for associations between unplanned or unwanted pregnancies and breastfeeding and postnatal depression (Warner 1996, Forman 2000).

Social support

Studies have consistently shown a negative correlation between postpartum depression and emotional and instrumental support during pregnancy (O'Hara and Swain 1996, Beck 1996). This field of investigation is considered in a specific later chapter.

Further considerations

Clinical and social factors have been further summarised as potential risk factors for postnatal depression in order of magnitude. Depression or anxiety during pregnancy, past history of psychiatric illness, adverse life events and social support deficits have

been reported as strong to moderate risk factors for postnatal depression (O`Hara and Swain 1996, Beck 2001, Robertson et al., 2004). Other psychological factors and marital relationship measures have been reported as moderate risk factors, and obstetric factors and socioeconomic factors as small risk factors (O`Hara and Swain 1996, Beck 2001, Robertson et al., 2004). Beck (2001) also reported that childcare stress and maternal self esteem are moderate risk factors and unwanted pregnancy is a small risk factor.

Robertson et al., (2004) also added that studies conducted within Western societies have found no association between the gender of the child and postpartum depression. However, studies provide evidence from India (Patel et al., 2002) and China (Lee et al., 2000) which suggest that spousal disappointment with the gender of the baby, specifically if the baby is a girl, is significantly associated with developing postpartum depression. Therefore, the parent's reaction to the gender of the baby may be a potential risk factor for postpartum depression within certain cultural groups.

Specific risk factors for major postnatal depression have been extensively reviewed and studies to date have not indicated that subclinical postnatal depressive symptoms differ substantially from clinical depression in aetiology (Davey et al. 2008).

Ethnicity, culture and migration have received some consideration. Although comparative studies within multiethnic societies have generally found little difference between ethnic groups (NHMRC 2000), there have been relatively few studies of this type and no country appears to have anything approaching a comprehensive epidemiological overview of the postnatal maternal mental health of its major ethnic

groups (Abbott and Williams 2006). Despite a substantial body of research examining relationships between migration, acculturation and mental health, little of this has specifically addressed postnatal depression (Abbot and Williams 2006). While migrants do not necessarily have elevated rates of mental disorder generally, some subgroups may be at particularly risk.

Factors not associated with postnatal depression

Two meta-analyses of over 10,000 subjects concluded that the following factors were not associated with postnatal depression (O'Hara and Swain 1996, Beck 2001): maternal age (in samples of women aged over 18 years), level of education, parity, and length of relationship with partner.

CHAPTER A.6 Risk factors for antenatal depression

Although several meta-analyses have summarized risk factors for postnatal depression, there is only one systematic synthesis (Lancaster et al. 2010) and a limited number of reviews (Ryan et al., 2005, Bowen and Muhajarine 2006, Leigh and Milgrom 2008) of the literature on risk factors for depressive symptoms during pregnancy.

Socioeconomic status

Inconsistent results have been found for three subcomponents of socio-economic status: income, employment, and education. Lower income had a small correlation with depressive symptoms, and lower educational attainment demonstrated a small association but was not significantly associated with depressive symptoms in a recent meta-analysis (Leigh and Milgrom 2008). Finally, unemployment was not significantly associated with depressive symptoms. In another recent meta-analysis, there was no significant association between socio-economic status and depressive symptoms (Lancaster et al. 2010).

Anxiety and stress

In the general population, depression and anxiety are recognised to be highly comorbid, with almost 60% of individuals with major depression also meeting criteria for an anxiety disorder (Kessler et al., 2003). Anxiety has been consistently found to be strongly associated with antenatal depressive symptoms. In a review by Leigh and Milgrom (2008), antenatal depression was most significantly predicted from the set of independent variables by low self esteem, antenatal anxiety, and social support respectively.

Life stress

In the meta-analysis by Lancaster et al. (2010), when considering all types of life events, there was a small-to-medium association with antenatal depression in bivariate analysis but inconsistent results in multivariate analysis. However, negative life events were significantly associated with an increase in depressive symptoms. A major life event was one of the seven risk factors which predict antenatal depression in one study (Leigh and Milgrom 2008). Regarding daily stressors (which are rated as irritating, frustrating demands that occur during everyday transactions with the environment), no significant association was found with antenatal depression (Da Costa et al., 2000).

Lifetime depression history

A personal history of depression was significantly associated with an increased risk of antenatal depressive symptoms (Lancester et al., 2010), but was not found to be a risk factor for antenatal depression in another meta-analysis (Leigh and Milgrom 2008). Several studies addressed the relationship between a history of depression and depressive symptoms during pregnancy (Records and Rice 2007, Flynn et al., 2007, Seguin et al., 1995, Zuckerman et al., 1989). A personal history of depression was significantly associated with an increased risk of antenatal depressive symptoms.

Domestic violence

Domestic violence has received relatively little research in relation to antenatal depressive symptoms/syndromes. Eight studies addressed the relationship between a history of domestic violence and antenatal depression. In one study of 128 women, a

history of abuse within the past year was associated with an almost 2.5 times higher odds of a positive screen for depression (Jesse et al., 2005). However, a meta-analysis concluded only a small-to-medium sized association between domestic violence and depressive symptoms (Lancaster et al., 2010).

Pregnancy intent

Unintended pregnancy has been found to have a moderate correlation with antenatal depressive symptoms (Lancester et al., 2010), and was found to be associated with both antenatal depression and postnatal depression in a longitudinal study from China (Lau et al 2010). In another longitudinal study by Christensen et al., (2011), unintended pregnancy was not associated with a high pattern of depressive symptoms in pregnancy, but was associated with a marginally significant nearly four-fold increase in risk of elevated depressive symptoms postpartum.

Social support

Several studies have demonstrated associations between a lack of social support and antenatal depressive symptoms. These are considered in detail in a later chapter.

Intimate relationships

This exposure is also considered in detail in a later social support chapter.

Additional factors with inconsistent or null findings

Inconsistent findings to date include those for smoking, alcohol use, illicit drug use, parity, maternal race/ethnicity, and maternal age. In addition, previous obstetric history

(e.g. spontaneous abortions, elective abortions, and foetal deaths in uteri) has not been found to be significantly associated with depressive symptoms.

A total of 159 articles were included by Lancaster et al., (2010) in a meta-analysis of risk factors for, or correlates of, antenatal depression. Approximately half (54.1%) of the studies were performed in the United States. Seventeen studies (10.7%) were longitudinal in design, and 52 studies (32.7%) included multivariate analysis. The 159 studies used 24 different depression screens, with the Center for Epidemiological Studies Depression Scale (31.4%), the Edinburgh Postnatal Depression Scale (18.2%), and the Beck Depression Inventory (17.0%) being the most common. Only 20 studies (12.6%) used a formal diagnostic assessment for depression. Maternal anxiety, life stress, history of depression, lack of social support, unintended pregnancy, Medicaid insurance, domestic violence, lower income, lower education, smoking, single status, and poor relationship quality were associated with a greater likelihood of antenatal depressive symptoms in bivariate analyses. Life stress, lack of social support, and domestic violence continued to demonstrate a significant association in multivariate analyses.

In another review by Leigh and Milgrom (2008), significant predictors for antenatal depression were concluded to be low self-esteem, antenatal anxiety, low social support, negative cognitive style, major life events, low income and history of abuse.

Table A.6 presents a summary of cross sectional, case control, and cohort studies of psychosocial risk factors for antenatal depression.

Table A.3. Summary of psychosocial risk factors studied in antenatal depression						
Study	Country	Sample size	Assessments	Gestational age at screen week	Associated risk factors	Inconsistent or null findings
Affonso 1991	US	202	HSCL SADS	10-14 20-22 30-32	Life stress Social support Relationships	Demographics
Alati et al., 2005	Australia	4527	DSSI	First antenatal care visit	-	Substance abuse
Alvik et al., 2006	Norway	1424	HSCL	17-18 30	-	Substance abuse
Armstrong 2004	US	40	CESD	15-32	Psychological	-
Bennett et al., 2007	US	766	CESD	Unknown	Domestic violence Relationships	Substance abuse
Bergner et al., 2008	Germany	108	DEPS	Each trimester	Life stress	Obstetric history
Bernazzani et al., 1997	Canada	213	BDI	2nd trimester	Life stress Social support Relationships	Nulliparity
Blaney et al., 2004	US	307	CESD	24	Life stress Social support	Demographics Obstetric history
Bowen and Muhajarine	Canada	39	EPDS	Varied	Social support Relationships	Substance abuse
Cooklin et al., 2007	Australia	144	EPDS PoMS	3rd trimester	Relationships Demographics	Demographics
Da Costa et al., 2000	Canada	80	DACL	Every month	Life stress Social support Relationships	-
Edge et al., 2004	England	301	EPDS	3rd trimester	Maternal race	-
Elsenbruch et al., 2007	Germany	896	ADS-K	1st trimester	Social support	Demographics
Flynn et al., 2007	US	1131	CESD	Varied	Depression history	Substance abuse
Fortner et al., 2011	US	921	EPDS	Early pregnancy	Marital status Substance abuse	-
Franche and Mikail 1999	Canada	62	BDI	10-24	Psychology	Obstetric history

Glazier et al., 2004	Canada	2052	CESD	24	Psychology Life stress Social support Relationships	Demographics
Grant et al., 2008	Australia	100	EPDS MINI	3rd trimester	Psychology	Lower education
Heaman 1992	Canada	56	PoMS	3rd trimester	Life stress Social support	-
Hobfoll et al., 1995	US	192	BDI SADS	2nd 3rd trimester	Lower income Lower education	Obstetric history Unemployment Maternal age
Holzman et al., 2006	US	1321	CESD	16-26	Life stress Domestic violence Demographics	Maternal race
Jesse et al., 2005	US	130	Self-developed	16-28	Life stress Social support Domestic violence Demographics	Substance abuse
Jesse and Swanson 2007	US	120	Self-developed	16-28	Life stress Social support Demographics	Substance abuse
Kaaya et al., 2010	Tanzania	787	HSCL	3rd trimester 3 months 8 months	Psychology Relationships	-
Kamysheva et al., 2010	Australia	257	BDI	2nd trimester Late pregnancy	Physical symptoms Sleep quality	-
Larsson et al., 2004	Sweden	1489	EPDS	5-36	Relationships	Demographics Obstetric history
Lau 2011	China	1527	EPDS		Marital conflict Parent-in-law conflict Social support	Obstetric history

					Unintended pregnancy	
Leathers and Kelley 2000	US	124	CESD	3rd trimester	Social support Relationships	-
Morse et al., 2000	Australia	251	EPDS	24-26 36	Psychology Social support Relationships	Maternal age Nulliparity
Manzolli et al., 2010	Brazil	627	PRIME-MD	Pregnancy	Low education Substance abuse	-
Moss et al., 2009	Australia	159			Anxiety	-
Norbeck and Tilden 1983	US	117	DACL	12-20 (mean 16.2)	Psychology	-
Pajulo et al., 2001	Finland	391	EPDS	18-35 (mean 23)	Social support Relationships	Demographics Substance abuse Obstetric history
Potinger et al., 2009					Demographics Psychology	-
Records and Rice 2007	US	139	CESD	3rd trimester	Psychology Life stress Social support Domestic violence Relationships	Obstetric history
Ritter et al., 2000	US	191	BDI	2nd 3rd trimester	Life stress Social support	Maternal race
Rodriguez et al., 2008	US	210	BDI	12	Domestic violence	Maternal age
Rubertsson 2005	Sweden	3011	EPDS	15	Life stress Social support Relationships	Demographics Obstetric history
Rubio et al., 2008	US	486	EPDS CES-D	4th month pregnancy birth, 8, 18 months, 3, 6, 10, 14, 16, 22 years postnatal	Less education Substance abuse	-

Seguin et al., 1995	Canada	144	BDI	30	Life stress Social support Relationships	Demographics
Skouteris et al., 2009	Australia	252	BDI	Mid and Late pregnancy	Psychology	-
Söderquist et al., 2004	Sweden	951	BDI	12-20 (mean 18)	Psychology	-
Tilden 1984	US	141	DACL	2nd trimester	Relationships	-
Vander Weg et al., 2004	US	245	CESD	Unknown	Relationships	Demographics
Westdahl et al., 2007	US	1047	CESD	2nd trimester (mean 18)	Social support Relationships	Demographics
Zayas et al., 2002	US	106	BDI	3rd trimester	Life stress Relationships	Demographics
Zelkowitz et al., 2004	Canada	119	EPDS	Varied	Life stress Social support Relationships	Demographics
Zuckerman et al., 1989	US	1014	CESD	Pregnancy	Life stress Social support Relationships	Demographics Substance abuse Obstetric history

CHAPTER A.7 Social support and perinatal depression

Social support concepts

Social support is a multidimensional concept which continues to attract debate as to how it should be defined, conceptualized, and measured, often leading to different and inconclusive results in the literature (Bates and Toro, 1999). Despite such divergence in measurement, social support has been consistently identified as an important personal resource relevant to individuals' mental health. In particular, having more social support has been associated with lower levels or fewer symptoms of depression (Lee et al., 2010).

Social support can be divided by function: for example, *informational* support where advice and guidance is given, *instrumental* support involving practical help in terms of material aid and/or assistance with tasks, and *emotional* support involving expressions of caring and esteem. Social support has been theorized to consist of several different measurable domains from both sociological and psychological perspectives (House, 2002, Spoozak et al., 2009).

As described by Warren et al. (2011), a number of activities can be covered by social exchanges including the provision of information (informational support), hands-on services (instrumental support), sharing of experiences (emotional support), and offering approval (appraisal support). These activities have been termed 'functional dimensions' of social support. Conversely, 'structural support' consists of a set of people in the social network, which can either be formal sources (e.g. health professionals) or informal (e.g. family, friends, or peers).

A moderating model has been used to conceptualize an individual's social environment as protecting him or her from the potentially deleterious effects of high levels of stress (Frazier et al., 2004). This model proposes that social support may prevent an event from being perceived as stressful, thus making negative consequences less likely, or that it may assist in the provision of solutions in terms of adaptive responses. In this sense, social support may decrease the intensity or number of life events that are seen as crises and/or may aid an individual in acquiring the means and skills required to buffer the effects of stressors (Viswesvaran et al., 1999). However, the empirical evidence for the moderating effects of social support has been mixed in studies of the general population (Viswesvaran et al., 1999). In community studies, receiving social support through friends and relatives during stressful times is thought to be a protective factor against developing depression (Brugha 1998). However, it is likely that support systems are situation-dependent and, in this respect, sources of support in relation to perinatal period may be particularly related to the spouse and close relatives, as well as friends.

Spoozak et al (2009) elaborated that it is good to measure general perceived social support in terms of particular sources of support, such as from the mother or father, and that each relationship will have a different strength and nature of support in pregnant women. Therefore, it is important to evaluate and score each of these categories separately in the overall construction of the summed scale, rather than use a broad evaluation of relationships such as ‘family’.

From a methodological perspective, some limitations of the previously mentioned studies on social support and PND have been identified. Previous research has been criticised for using a variety of data collection methods and instruments to measure social support

(Logsdon et al., 1996, Warren et al., 2011), which make comparisons of results difficult. Some studies have examined the formal structural social support input of individual health professionals such as midwives only or public health nurses only (Plews et al., 2005) and informal social support from peers, partners, and grandparents (Dennis, 2003). Different types of scales are used. For example, Spoozak et al (2009) recently replicated the psychometric properties of the Kendler Social Support Interview modified for use in pregnant women and established the inventory's relationship to depression in pregnancy. Gotlieb and Bergen (2010) have described social support concepts and measures in a recent review.

Social support and postnatal depression

Meta-analyses and many reviews have consistently found a negative correlation between postnatal depression and emotional and instrumental social support (O'Hara and Swain 1996, Beck 1996, Beck 2001, Miller 2002, Postmentier et al., 2004, Robertson et al., 2004, Goldbort 2006, Scrandis et al., 2007, Klainin 2009, Sawyer 2010).

According to O`Hara and Swain`s (1996) meta-analysis, low social support and poor marital relationship are two of the strongest predictors of postnatal depression. As described earlier, a meta-analysis of 44 studies was conducted to determine the magnitude of the relationship between postpartum depression and a range of predictor variables. After antenatal depression, child care stress and life stress, social support showed the strongest effect sizes – higher than those for antenatal anxiety, maternity blues, marital satisfaction, and history of previous depression (Beck 1996).

Two studies have found that perceived social isolation (or lack of social support) during pregnancy is a strong risk factor for postnatal depressive symptoms (Segiun et al., 1999, Forman et al., 2000), confirmed in a recent study's finding that receiving informational support from a large number of social network members was protective against postnatal depression (Kitamura 2006).

A longitudinal study of 512 first-time mothers identified the prevalence of PND and examined the relationships between functional and structural social support at 6 and 12 weeks postpartum (Warren et al., 2011). The prevalence of PND was 13.2% at 6 weeks and 9.8% at 12 weeks. At 6 and 12 weeks, the only social support dimension independently associated with PND was total functional social support. At-birth formal structural support and emotional functional support were independently predictive of PND at 12 weeks.

A systematic review of the literature on support programs in the postpartum period (Shaw et al., 2006) found that neither home visitation nor peer support reduced depression scores for mothers as measured by the Edinburgh Postnatal Depression Scale. Furthermore, the researchers concluded that no randomized control trial evidence was found to endorse universal provision of support to unselected low-risk women because it did not improve maternal mental health. However, mothers at high risk of PND who received home visitation or peer support, respectively, had significant reductions in depression. Although Shaw et al. (2006) asserted that there was no evidence that "universal postpartum support" was of benefit to mothers, they concluded that there was evidence that mothers at high risk of PND would benefit from formal and informal structural social support home visits such as that provided by health professionals and peers.

Social support and antenatal depression

As described above, considerably less research has investigated factors specifically associated with antenatal depressive symptomatology. This is true for social support as an exposure, and relatively few studies have intensively reviewed predictors such as marital conflict, parent-in-law conflict, and perceived availability of social support on antenatal depressive symptoms.

Those studies that have been carried out with this outcome have found that greater perceived availability of social support during pregnancy is associated with lower depressive symptoms (Ford and Ayers, 2009; Spoozak et al., 2009, Smith et al., 2009). Conversely, a lack of social support has been found to be an important and consistent risk factor for depressive symptoms during pregnancy (Ford and Ayers, 2009). It has therefore been postulated that social support plays an important role in predicting women's emotional status during pregnancy (Raymond, 2009). Two other studies have found that social support has a moderating effect on the development of antenatal depressive symptoms (Felice et al., 2004; Rahman et al., 2003).

Lau (2011) investigated the association between perception of the availability of social support by women in the second trimester and antenatal depressive symptoms in the third trimester. The Interpersonal Support Evaluation List (ISEL) was used to measure the perceived availability of social support and EPDS was used to assess depressive symptoms. The ISEL is a multidimensional inventory with four subscales of perceived availability of social support: emotional, belonging, tangible, and self-esteem support. Lack of the perceived availability of social support (ISEL) by women in the second trimester was found to be associated with increase risk of depressive symptoms in the

third trimester. However, in another study, antenatal depression and control groups did not differ in terms of the number of individuals who could give three types (emotional, informational, and instrumental) of support when necessary (perceived social support) and their satisfaction (Kitamura 2006).

According to the meta-analysis by Lancaster et al. (2010), studies demonstrated a medium correlation between a lack of social support and antenatal depressive symptoms. However, in multivariate analysis, the average effect size was relatively small. In addition, studies specifically measuring intimate partner support, demonstrated that a lack of partner support was also significantly associated with increased risk of depressive symptoms during pregnancy.

The incidence and persistence of perinatal depression in relation to social support

The transition to motherhood can be conceptualised as a major life event and thus potentially important in determining risk of perinatal depression, although as described earlier it is not clear that depression incidence is specifically 'postnatal'. It is reasonable to suppose that social support may help with the transition, as with other life events, particularly social support derived from partners, peers, and mothers as well as potentially from formal sources such as home visits from health care professionals. According to the literature review by Xie et al., (2009), only a few studies have assessed social support using a formal instrument and only three of these measured social support in pregnancy more than once, and did not compare the effects of social support in pregnancy and postnatal period. The findings of two other studies (Leung et al., 2005, Xie et al., 2009) are consistent in finding that half of the variance of PND was explained by social support

and stress factors. However, no studies were found which investigated social support as a predictor of the incidence or persistence of perinatal depression.

Cross-cultural considerations

While risk factors for perinatal depression are generally fairly similar across cultures (O'Hara et al. 1996), the meaning and significance of particular factors may vary. For example, Stuchbery et al. (1998) found that low social support was associated with postnatal depression in Arab, European and Vietnamese mothers, but that the source and type of support varied. At least some differences appear to arise from varying cultural expectations with regard to marital relationships and family/community support (Abbott et al. 2006). A study from Israel reported that lack of social support and marital disharmony were strong predictive risk factors for postnatal depression (Glasser 2000), and a similar study from South Africa also found an association between the risk of postnatal depression and family relationships, social support, and preparation for motherhood (Mills 1995). A recent prospective cohort study in China found that a lack of postnatal family support, especially support from the husband, was an important risk factor for postnatal depression in that culture (Xie at al. 2010).

Some cross-cultural analyses of postnatal depression have proposed that low social support is a shared aetiology across cultures (Goldbort 2006). Klainin and Arthur (2009) reviewed risk factors for postnatal depression among women in Asian cultures and found that low social support and low marital satisfaction were consistent predictors. Psychological, obstetric/paediatric, socio-demographic risk factors are consistent with results from other meta-analyses derived primarily from Western populations. Sawyer (2010) reviewed evidence on the prevalence and risk factors of maternal mental health

disorders in African women living in Africa. Lack of support and marital/family conflict were concluded to be associated with poorer mental health, while socio-demographic and obstetric correlates were inconclusive. Findings were largely consistent with research in developed countries

Studies of confinement

Confinement has received some attention as a specific practice which varies between cultures and might confer some heterogeneity in risk of postnatal depression. However, the nature of the confinement experience is itself complex and heterogeneous, possibly involving some factors that might increase postnatal depression by increasing unwelcome interpersonal contact or are perceived as an obligation or series of restrictions which the mother does not find helpful. It has been suggested that confinement should no longer be taken at face value as a uniformly helpful practice (Chee et al. 2005) as culturally mandated social support is a complex phenomenon which cannot be assumed to be always helpful to the mother. Asian cultures adopt a variety of postnatal rituals including prescribed confinement periods ranging from 30 to 40 days, restricted activities and diets, and practical/emotional support from family members—mother, mother-in-law, traditional birth attendant, or female relatives. Such cultural practices may be perceived as a double-edged sword which offers physical comfort on the one hand but which might equally heighten interpersonal conflicts and emotional frustration on the other. Postnatal rituals in Japan, Vietnam, Malaysia, Hong Kong, and Singapore have not been found to be associated with significant psychological benefits for new mothers (Klainan and Arthur 2009).

Potential effects of depression on social support

Depression and lower social support are frequently associated in cross-sectional analyses. However, direction of causation cannot be inferred from this design and bi-directional pathways are plausible. The clinical course and epidemiology of major depressive episodes (MDEs) may thereby be influenced by reciprocal interactions between an individual and the social environment. Patten et al (2010) assessed this relation in a large sample (n=8477) and 8 years of follow-up data. Interviews included a brief diagnostic indicator for MDE, the Composite International Diagnostic Interview Short Form for Major Depression (CIDI-SFMD), the Medical Outcomes Study Social Support Scale (MOSSS) and a set of relevant demographic and health-related measures. The MOSSS assesses total social support and four specific dimensions of social support. Lower quartile total social support ratings predicted MDE incidence. However, MDE was also associated with emergence of lower-quartile affection subscale scores, although not with other aspects of social support. The authors concluded that low social support appears to be a robust risk factor for MDE and can be used to identify persons at higher risk of MDE. Evidence that MDE has a negative effect on social support was weaker and was restricted to affection social support.

Stice et al (2004) tested whether deficits in perceived social support predicted subsequent increases in depression and whether depression predicted subsequent decreases in social support using longitudinal data from a sample of 496 adolescent girls. Deficits in parental support but not peer support predicted future increases in depressive symptoms and onset of major depression. In contrast, initial depressive symptoms and major depression predicted future decreases in peer support but not parental support. These results are consistent with the theory that support decreases the risk for depression although suggest that this effect may be specific to parental support during early adolescence. However, the

results are also consonant with an effect of depression on promoting support erosion, although imply that this effect may only occur with peer support for this type of sample.

These findings are clearly derived from samples which may not generalise to mothers in the perinatal period. Although lower levels of social support have been studied widely as a risk factor for perinatal depression, to our knowledge no study has researched the effect of perinatal depression on social support in any respect.

The marital relationship

Closely linked with findings on social support, studies have reported an increased risk of postnatal depression in women who experienced marital problems during pregnancy (O'Hara and Swain 1996, Beck 2001). With the added burden of childcare, the relationship between partners may suffer, and there is less time for socializing and therefore for drawing support from a pre-existing network outside the family. These stresses should be borne in mind when evaluating the role of factors in the development of postnatal depression. Studies suggest that couples experience a decline in marital satisfaction during pregnancy which might represent the first step in a deteriorating course of dyadic functioning (Lawrence et al., 2007). Research also shows that marital conflict has a significant effect on, and is a stressor for, depression in pregnant women (Lancaster et al., 2010).

Intimate relationships

Nearly 30 studies evaluated intimate relationships and their association with depression during pregnancy. More than half of studies specifically addressed relationship status. Depressive symptoms have been found to be higher in women who are not in a cohabiting

relationship. Some of the studies evaluated relationship quality. Improved relationship quality was associated with a lower likelihood of depression. However, the results were inconsistent in Lancaster et al. (2010) meta-analyses. In multivariate analysis, the results were inconsistent in terms of association between noncohabitaion and antenatal depression and the association was not significant between improved relationship quality and antenatal depression.

In many cultures, raising a child is the responsibility of not only the parents but also the extended family, with the grandparents playing a major role as childcare providers (Goh et al., 2009). Parents-in-law may see themselves as key providers of, and therefore decision makers in, perinatal care practices. Previous studies have stressed the importance of pregnant women learning about traditional practices from their parents-in-law (Geckil et al., 2009). Tension and conflict between traditions and modernity, however, may result due to incompatible value systems (Lee et al., 2009), and antenatal depression has been found to be associated with worse relationships between mothers and their parents-in-law (Lau and Wong, 2007).

Therefore, the daily stresses of family (marital and in-law) conflict may act as a risk factor for worse mental health in the perinatal period. Empirical evidence indicates that family conflict can be considered a chronic stressor (Whitson and El-Sheikh, 2003) that may have a long-lasting adverse influence in this respect (Seguin et al., 1995). One study reported an effect of family conflict in the second trimester on antenatal depressive symptom in the third trimester among Hong Kong Chinese women (Lau 2011), with father-in-law and mother in-law conflict found to be a significant risk factor for antenatal depressive symptoms after controlling for potential confounders. In operational terms, a

moderating effect of social support was demonstrated by interactive effects of a stressor (family conflict) and support (perceived availability of social support) on antenatal depressive symptoms, indicating that the effect of support is much greater for persons subjected to high levels of stress (Wills and Fegan, 2001).

CHAPTER A.8 Studies of perinatal depression in Turkey

Throughout the 20th century, Turkey has experienced substantial demographic, socio-cultural and economic transformations. The population increased from 13 million (10 % urban) to 67 million (65 % urban) over this period, with particularly rapid growth over the last few decades (Republic of Turkey 2002), and is expected to reach 87 million in 2025 (Unalan 1997). These rapid changes have been accompanied by adverse consequences such as poverty, unemployment, limited social services, and an imbalance in income distribution (Republic of Turkey 2000, WHO 1997, 2000). A particularly important consequence of population expansion and trans-national and rural-urban migration has been the disruption of traditional family-based support structures. As a historical bridge between Europe and Asia, Turkey has also been undergoing social and cultural transformation. Traditional eastern values and social structures are becoming less important, but a western social infrastructure has not yet been established to replace these. Taken together, these changes have an important potential impact on maternal health in the perinatal period that might well be mediated through loss of traditional support networks. Beside these, there are various other chronic social problems impacting women's health including, high birth rate, low education level, poverty, insufficient health care, and an inadequate social security system in the country.

From the literature search carried out for this thesis, six cohort studies, one case control study and fifteen cross-sectional surveys were identified providing information on perinatal depression in Turkey and are summarized in Table A.8. Only two previous cohort studies have covered both the antenatal and postnatal period.

A. 8. 1 Prevalence, incidence and persistence of perinatal depression in Turkey

From previous research perinatal depressive symptoms appear to be particularly common in Turkey (Tezel et al. 2006). The prevalence of postnatal depression of high (≥13) EPDS scores in Eastern Turkey was substantially higher (34.6%) than the reported prevalence in many western countries (Aydin et al. 2005). In three previous studies, prevalences in the early postnatal period of similarly high scores were: 28.1 % (EPDS ≥13), 25.6 % (EPDS ≥12) and 17.7 % (EPDS ≥13) (Ayvaz et al. 2006, Dindar et al. 2007, Kirpinar et al. 2010 respectively). These prevalences remain somewhere between those observed in other Middle Eastern countries and the more common Western estimates. The prevalence of PND symptoms was 43% at an EPDS cut-off score of 10, and 26% at the more stringent cut-off score of 13 among Israeli Bedouin women (Glasser et al., 2011). Kheirabadi and Maracy (2010) conducted a study on 1898 Iranian women, and found a prevalence of depression (BDI score >20) in the third trimester of 22.8% and a prevalence (EPDS score >12) between 6 to 8 weeks after delivery of 26.3%. Incidence of PND in 6 to 8 weeks after delivery in those who were not clinically depressed during pregnancy was 20.1% in this Iranian sample. Intermediate levels in Turkey would be consistent with the position of its culture between western and traditional Middle Eastern models (Danaci et al. 2002).

Considering prospective findings from Turkey, Gulseren et al. (2006) reported that the prevalence of depression was highest in pregnancy (21.6%) and declined gradually over a 6 month follow-up period at 5-8, 10-14 and 20-26 weeks postpartum assessments (respectively 16.8%, 14.4% and 9.6%). Only one study was identified which reported incidence of major depression in the postnatal period: according to Akman et al (2007), new onset of major depression was 6.3% assessed by the SCID. Although Ayvaz et al.,

(2006) studied the persistence of PND, statistics for this were not clearly displayed. Therefore no studies of perinatal depression persistence were identified.

Table A.4. Summary of perinatal depression studies in Turkey

Author, year	Study design	Depression measure	Sample size	Prevalence %	Time of assessment
Akman et al., 2007	Cohort study	SCID	302	-	1. day after birth 6 w postnatal
Aydin et al., 2005	Cross sectional survey	EPDS ≥13	728	34.6	1 - 12 months postnatal
Ayvaz et al., 2006	Cohort study)	EPDS ≥13 BDI ≥ 17	192	28.1	6 m postnatal
Bugdayci et al., 2004	Cross sectional survey	EPDS ≥13	1447	42.7	0 - 12 months Postnatal
Danaci et al., 2002	Cross sectional survey	EPDS≥ 13	257	14.0	0 - 6 months Postnatal
Dindar et al., 2007	Cross sectional survey	EPDS≥ 12	679	25.6	0 - 12 months Postnatal
Ege et al., 2008	Cross sectional survey	EPDS ≥13 MSPSS	364	33.2	6 - 48 w Postnatal
Ekuklu et al., 2004	Cross sectional survey	EPDS ≥12	178	40.4	6 w Postnatal
Golbasi et al., 2009	Cross sectional survey	EPDS≥ 13 MSPSS	258	27.5	Not indicated Antenatal
Gulseren et al., 2006	Cohort study	EPDS≥ 13	125	21.6 16.8 14.4 9.6	2^{nd} -3^{rd} trimester 5-8 w postnatal 10-14w postnatal 20-26w postnatal
Gurel et al., 2000	Cross sectional survey	BDI ≥ 17	85	35.1	1 w Postnatal
Inandi et al., 2002	Cross sectional survey	EPDS≥ 13	2514	27.2	0-12 months Postnatal
Inandi et al., 2005	Cross sectional survey	EPDS≥ 13	1350	31.1	0-12 months Postnatal

Kara et al., 2007	Case control study	BDI ≥ 17	163 postnatal 163 control	17.0 24.5	1-3 months Postnatal
Karacam et al., 2009	Case control study	EPDS≥ 13	314	27.9	0-9 months Antenatal
Kirpinar et al., 2010	Cohort study	EPDS≥13	479	17.7 14.0	1 w postnatal 6 w postnatal
Ozbasaran et al., 2011	Cross sectional survey	EPDS ≥ 13 PSS	293	28.3	2^{nd} – 24^{th} w postnatal
Sabuncuoglu and Berkem, 2006	Cross sectional survey	EPDS≥ 11 AAQ	80	30.0	2-18 months Postnatal
Sayil et al., 2006	Cohort study	BDI≥17	200	Not quoted – a study of associations with antenatal anxiety	6-8 m antenatal 6-8 m postnatal
Uguz et al., 2009	Cross sectional survey	EPDS ≥13	34	32.4	12 months Postnatal
Yagmur et al., 2010	Cross sectional survey	EPDS ≥13 MSPSS	785	21.0	0-12 months Postnatal

A. 8. 2 Risk factors for perinatal depression in Turkey

In general, research in Turkey has tended to confirm risk factors suggested from Western populations such as low income and socio-economic status, previous mental disorders and perceived poor child health. In particular, significant associations have been found in several studies between postnatal depression and social factors such as having an unemployed husband, reported lack of support from the husband, a past history of psychiatric conditions and/or premenstrual symptoms, and a temperamentally difficult child (Kirpinar et al. 2010, Aydin et. al. 2005, Sayil et al. 2006). Lower economic status, less access to support from family members and close friends, emotional distress at the pregnancy, unplanned pregnancy, health problems during pregnancy, lower perceived standard of baby care after delivery, and mental disorder before and during pregnancy has also been found to be risk factors for depression in the first postnatal year (Inandi et al. 2005). However, in a recent cohort study where women were interviewed at the first day and six weeks after giving birth the incidence of major depression was found to be unrelated to age, educational level, employment status, planned or unplanned pregnancy, history of abortion or gestational complications, term of delivery, type of delivery, gender of the baby, or mother's breast-feeding; significant associations were, on the other hand, found with primiparity and obsessive-compulsive personality disorder (Akman et al. 2007). Uguz et al. (2009) found that depression at one year post-partum was unrelated to age at assessment, primiparity, and number of children, employment status, economic status or educational level.

In Edirne in western Turkey, factors such as low educational level, an unemployed husband, living in rented house and having psychological or other problems during a pregnancy were the most significant risk factors for postnatal depression (Ekuklu et al.,

2004). In Mersin in southern Turkey, factors associated with postnatal depression prevalence was associated with previous psychiatric history, psychiatric disorder in the spouse, and having worse relations with the spouse and his parents, living in a shanty town setting, immigrant status, the number of living children, and serious health problems in the baby (Danaci et. al 2002). In eastern Turkey, there is strong gender preference for male children and mothers of female babies were found to have a higher risk of depression (Inandı et al 2002). The family's preference for a male infant in the previous pregnancy, a female infant in the previous delivery and unwanted pregnancy were found to be associated with postnatal depression in Edirne in western Turkey (Ekuklu et al. 2004).

A. 8. 3 Social support and perinatal depression in Turkey

Social roles for women and family support structures differ between cultures and are likely to be important factors in the aetiology of perinatal depression, particularly in settings where these are rapidly changing. Although several studies have investigated associations between the quality of the marital relationship and perinatal depression, there has been very little formal evaluation of wider family networks. For example, in Turkey, as in many settings, mothers and mothers-in-law are traditionally expected to provide both practical and emotional support for mothers. The rapid social transitions currently occurring in Turkey and elsewhere place considerable strain on these relationships but the potential impact on perinatal depression remain unclear. Women in eastern Turkey and in more traditional settings may be particularly vulnerable, because of contextual factors such as gender discrimination, status in the community, limited educational opportunities, and lack of health services. Limited educational and occupational opportunities may therefore increase the vulnerability of women to psychosocial problems.

Level of social support has been implicated in several studies of perinatal depression: not only that from the husband (Aydin et al. 2005, Danaci et al. 2002) but also from the husband's family and the wife's parents (Inandi et al. 2005, Danaci et al. 2002). In three previous studies in Turkey, symptoms of postnatal depression were found to be negatively correlated with social support (Golbasi 2006, Ege et al. 2008), including specifically that from the family and from friends (Ozbasaran et al. 2010). Although traditional family relationships in Turkey are believed to be strong, Inandı et al (2002) observed that almost 40% of women complained of insufficient family support during pregnancy. No study was found which had reported risk factors for antenatal depression

in Turkey, neither was there any comprehensive prospective analysis of lower social support as a risk factor for incidence or maintenance of depression. As stated earlier, at least some of a cross-sectional association might reflect the impact of depression on social support networks rather than vice versa, but this has not been evaluated in a perinatal context in Turkey or elsewhere.

CHAPTER A. 9 The impact of perinatal depression on child development

Perinatal depression has substantial adverse impacts on the wellbeing of mothers (NIMH 2000) and has been suggested to have similarly important adverse consequences for children (NIMH 2000). Women with perinatal depression also have an elevated risk for recurrent depression during subsequent pregnancies and at other times (Cooper and Murray 1995). Several studies have also highlighted the potential impact of perinatal depression on important aspects of child health such as growth and infectious disease morbidity (Deave et al., 2008, Rahman et al., 2004). Moreover, Billings et al. (1983) reported that children of depressed parents had more physical health problems such as allergies, asthma, frequent colds and coughs, headaches and indigestion compared with children of non-depressed parents.

Associations with child behaviour/emotion

In developed countries, maternal depression has been found to be associated with long-term cognitive, emotional and behavioural problems in children, and the impact has also been found to be worse where the depressive episode is severe or prolonged (Grace et al., 2003; O'Connor et al., 2002). Talge et al. (2007) reviewed independent prospective studies over the past 15 years in which children showed an increased risk of anxiety, language delay and attention deficit/hyperactivity if their mothers were stressed during pregnancy. Prospective studies have also investigated the relationship between maternal perinatal depression and child behavioural outcomes and psychopathology. Josefsson et al. (2007) investigated the effects of maternal depressive symptoms during the postnatal period and when the child was 4 years old. Interestingly, they found that although postnatal depression did influence maternal rating of child behaviour at age 4 in boys,

this effect was no longer significant once the mothers' current depressive symptoms were also included in the model. The authors of this study concluded that women who had experienced postnatal depression were more likely to also have depressive symptoms when the child was 4 years and that these later depressive symptoms might be influencing the mothers' ratings of child's behaviour. Carter et al. (2001) found that maternal depressive symptoms during pregnancy and the postnatal period were both significantly associated with externalizing and internalizing problems in boys at age two and a half. No significant associations were found for girls leading the authors to speculate that there may be different pathways underlying effects between boys and girls as quality of early interactions between mothers and their daughters predicted problem behaviours in girls.

Associations with growth and physical development

Several prospective studies examined the association between postnatal depression and child development in the context of other potentially mediating outcomes such as feeding problems, and maternal-infant interaction (Galler et al., 2000, Grace et al., 2003, Patel et al., 2003, Grote et al., 2010, Santos et al., 2010, Sutter-Dallay et al., 2011). According to a meta-analysis by Grote et al. (2010), no growth differences were found at 2 years of age in children exposed to postnatal depression at 2, 3 or 6 months. Some studies have investigated the effect of antenatal depression on child outcomes, although principally fetal growth and preterm birth rather than later developmental delay (Rahman et al., 2002, Dayan et al., 2006, Patel and Prince 2006, Rahman et al., 2007, Stewart 2007, Patel et al., 2004, Hanlon et al., 2009, Tronick and Reck 2009, Kinsella and Monk 2009).

Deave et al (2008) investigated the effects of antenatal depression on child development in one of the largest prospective community-based studies, which followed women throughout pregnancy and into the child's adolescent years. In these analyses, authors used different cut-off points to describe depression and the association between depression (with using different cut-off points) and child development were assessed. Using cut-off point EPDS ≥10, depression at both 18 and 32 weeks of pregnancy was found to be associated with lower child development but only at borderline significance statistical levels. The odds ratio for developmental delay associated with antenatal depression at both time-points was 1.24 (95% CI 1.04–1.49) and after adjusting for smoking, maternal age and life events was 1.34 (95% CI 1.11–1.62). When the EPDS 12/13 cut-off was applied, the results followed a similar pattern with a raised odds of developmental delay (adjusted odds ratio 1.50; 95% CI 1.15–1.96). Applying a 14/15 cut-off led to similar results, although with wider and non significant confidence intervals. For each cut-off, further adjustment for postnatal depression made little difference to the effect sizes. In the same study, persistent depression during pregnancy was associated with a 50% increase in the odds of the child having a developmental delay at 18 month assessment, when adjusted for tobacco used in the first trimester of pregnancy, mother's age, and life events that had occurred in the last 8 months. Although the separate impact of maternal postnatal depression was not reported, the authors noted that when postnatal depression was added into the model the impact of maternal prenatal depression on child outcome was not significantly different (Deave et al., 2008).

While some studies indicate that these disturbances to child development can be of long duration and appear to be most evident in boys and disadvantaged groups (Murray and

Cooper 1997, Kurstjens and Wolke 2001) and while the evidence that maternal depression adversely affects the psychological and intellectual development of children has been described as compelling (Cooper and Murray 1998), the review by Grace (2003) concluded a small-sized relationship between PND and child behaviour up to five years but no significant effects on infant motor behaviour.

Associations with cognitive development

Cognitive development has also been investigated specifically. In the longitudinal study reported by Murray et al. (1992), 18-month outcomes on the Bayley mental development index in children were predicted by postnatal depression in mothers, this effect modified by infant sex (the performance of boys of mothers with postnatal depression was particularly poor), and potentially mediated by maternal communication with the infant. At 5 years, there was no evidence of an adverse effect of postnatal depression on cognitive functioning, even amongst vulnerable subgroups of children. Consistent with this, Di Pietro et al., (2006) examined the associations of antenatal and postnatal depression with later child cognitive functioning and found significant associations between antenatal depression and child scores at 24 months on the Mental Development Index (MDI) and Psychomotor Development Index (PDI), Bayley Scales of Infant Development mental and motor assessments, after controlling for postnatal depression at 6 weeks and 24 months.

Effect sizes

It is important to bear in mind that, other findings have questioned the importance of these effects. A meta-analysis by Beck (1998) reviewed the effects of postnatal depression on behaviour and cognitive development in children from 1-14 years of age.

She reviewed nine studies, four of which controlled for concurrent maternal depression. In the four studies which controlled for recurrent depression, the mean weighted effect size was 0.30 when controlling for sample size, and 0.34 when controlling for methodological rigour. Conventionally these are considered small effects. Moreover, studies with larger sample sizes found smaller effects on child behaviour and cognition, suggesting possible publication bias in this field. In a community cohort of 4,953 children and mothers self-reported maternal depressive symptoms were ascertained during pregnancy, 3-4 days postpartum, 6 months postpartum and 5 years later using the BDI. Depression at 3-4 days was not found to be associated with child behaviour, and only moderate or higher levels of maternal depressive symptoms at 6 months or 5 years significantly predicted child behaviour at 5 years. Severity and chronicity of depressive symptomatology however, did relate to child behaviour (Brennan et al., 2000).

Potential underlying mechanisms

There are a number of possible mechanisms through which maternal depressive symptoms could be linked to poor infant growth: mental stress during pregnancy is associated with poor foetal growth (Wadhwa 2005), but other mechanisms could include maternal under-nutrition and poor self-care (Rahman et al. 2002), or earlier cessation of breastfeeding (Henderson et al. 2003). Although severity and chronicity of maternal depression are related to increased developmental problems in their children, less is known about the importance of timing of the exposure to maternal depression, and in particular whether pregnancy is a sensitive period (Deave at al 2008). Women with depressive symptoms during pregnancy have been found to seek less antenatal care (Miller, 1992), gain less weight (Walker and Grobe 1999), use more drugs and alcohol, smoke more cigarettes, and feel more stressed (Zuckerman et al 1989). Substance use

and stress has been found to increase risk for premature birth and low birth weight (Orr and Miller 1995). In addition to health-related behaviours, variations in hormone production associated with maternal stress and depression may increase risk for cognitive and language delays in children by impacting foetal growth rates and foetal development of biological systems related to attention (Dayan et al., 2006). Potential confounding factors for the association between postnatal depression and infant health outcomes are low birth weight, preterm delivery duration of exclusive breast-feeding, maternal age, maternal body mass index, each parent's education, number of previous children, and nuclear vs. extended family structure (Medhin et al., 2010).

Research findings during the last decades on the links between perinatal depression and child development delay, diarrhoea, and breastfeeding have not been entirely conclusive. Some evidence suggests that depression during perinatal period may be significantly related to delay in child development, diarrhoea and breastfeeding practice whereas other studies have found no direct associations. Reasons for these contradictory results may lie in differences in: (1) study design, methods, sample sizes, and the timing, frequency, and type of perinatal depression measurement; (2) misclassification bias with respect to depression or birth outcomes; (3) the populations studied; and (4) the extent to which studies control for confounding factors such as socioeconomic status (SES), race/ ethnicity, antidepressant use during pregnancy, smoking, substance abuse, previous preterm birth, or obstetric/medical complications.

Cross-cultural and international studies

A meta-analysis of 19 studies conducted in high-income countries found postnatal depression to have a moderate-to-large adverse effects on maternal-infant interaction

during infancy (Beck 1995). These findings have been replicated in South Africa, with depressed mothers exhibiting less sensitive engagement with their infants (Cooper et al., 1999) resulting in increased insecure attachment in the infants (Tomlinson et al., 2005). Postnatal CMD may lead to early cessation of breastfeeding (Patel et al., 2003) or compromised hygienic feeding practices putting the infant at risk of infectious diseases (Rahman et al., 2007) Studies from South Asia (Anoop et al., 2004, Patel et al., 2003, Rahman et al., 2004, Black et al., 2009) have consistently found postnatal CMD to be associated with infant undernutrition after adjusting for potential confounders. However, in Latin America and sub-Saharan Africa findings have been more mixed. (Medhin et al., 2010) However, in a population-based cohort in South Africa (Tomlinson et al., 2006), no significant associations were noted between maternal CMD and child undernutrition. In a recent meta-analysis (Grote et al., 2010), the objective was to estimate the risk of preterm birth, low birth weight, and intrauterine growth restriction associated with antenatal depression. The risk of delivering an infant with low birth weight or intrauterine growth restriction was concluded to be higher among women from developing countries who experienced antenatal depression than their counterparts in the United States or European countries. Moreover, in US studies, antenatal depression tended to be associated with an elevated risk of preterm birth in women of predominantly lower socioeconomic status but not in women of middle- or upper-income status. Rahman et al. (2007) found a significant association between maternal depressive disorder and low birth weight in a prospective study in Pakistan. Other findings of these research groups are that infants of prenatally depressed mothers have poorer growth and an increased risk of diarrhoeal infection compared with infants of psychologically well mothers. However, such associations have not been found in Ethiopian and South African samples (Stewart 2007). Moreover, a cross-sectional US

study reported an association between postnatal depression and physical illness in children (Groer and Morgan 2007), suggesting that an association between maternal perinatal depression and childhood infections may also exist in high-income countries. In general, the questions are under-researched in lower income countries. Three studies based in health centres have found positive associations between maternal mental health and infant growth (Rahman et al., 2004) but have limitations of small, selective samples and designs that limit inferences regarding the direction of causation. Infants of depressed mothers have also been found to be less likely to be fully immunized at 12 months compared with infants of non depressed mothers (Rahman et al., 2004). The review by Parsons et al. (2011) on PND and child outcome in low middle income countries concluded that there was significant heterogeneity in prevalence rates and impact of postnatal depression on child outcomes across studies. Considering research in Turkey specifically, Yalcin et al (2010) found a group of children with infantile colic had mothers with high EPDS scores compared to children without infantile colic in a nested cohort study, but no other studies of this question were found.

Table A.5. Summary of prospective cohort studies investigating the effect of perinatal depression on child development

Reference, country	Depression measures	Depression examination points	Adjustments	Outcome measure	Summary of principal findings
Carter et al., 2001 USA	CES-D	*Antenatal* Pregnancy *Postnatal* 4 months 14 months	Parent income	CBCL ITSEA when the child was 30 months (Behavioural/ Psychological)	Antenatal and postnatal depressive symptoms were significantly associated with externalizing problems in boys but not in girls. Quality of early interactions predicted problem behaviours in girls
Deave et al., 2008 England	EPDS	*Antenatal* 18 weeks 32 weeks *Postnatal* 8 weeks 8months	Tobacco smoked in first trimester, mother's age, postnatal depression, life events at 8 months postnatal	Denver Developmental Screening Test at 18 months (Cognitive)	Maternal depression at both time points during pregnancy was associated with developmental delays, even after postnatal depression was controlled
Evans et al., 2011	EPDS	*Antenatal* 18 weeks 32 weeks *Postnatal* 8 weeks 8 months 18 months	Postnatal depression	Denver Developmental Screening Test at 18 months (Cognitive)	Persistent depression (EPDS ≥ 10 at both time-points) is associated with developmental delay. Applying the 12/13 and 14/15 cut-offs gave similar results. After further adjustment for postnatal depression, the effect sizes were slightly attenuated.
Gerardin et al., 2011 France	MADRS	*Antenatal* 8 months *Postnatal* Birth 2 months 6 months 12 months	Postnatal depression	NBAS at birth (behavioural) ITSEA 12 months (emotional)	Male newborns of mothers with antenatal depression had lower scores than controls in motor skills and regulation of behaviours. At 1 year, infants of antenatal depressed mothers presented higher scores on generalized anxiety, particularly in males activity/impulsivity and sleep problems than controls
Hay et al.,	CIS	*Antenatal*	Antenatal depression,	WISC-III Full	Postnatal depression predicted adolescent

2010 England		14-20 weeks 36 weeks *Postnatal* 3 months 12 months	adolescent sex, factors effecting the intrauterine environment	Scale IQ at 11 or 16 years (Cognitive)	IQ, with offspring of women with PND having a lower IQ. Antenatal depression did not predict IQ, once postnatal maternal depression was controlled
Luoma et al. 2001 Finland	EPDS	*Antenatal* Late pregnancy *Postnatal* 2 months	None stated	Parent report on the CBCL, teacher reports when the child was 8 to 9 years (Behavioural/ Psychological)	Antenatal depressive symptoms predicted high externalizing problems and total problems as reported by mother and teacher. Postnatal depression predicted maternal reports of social competence
Luoma et al., 2004 Finland	EPDS	*Antenatal* 3rd trimester *Postnatal* 2 months 6 months postnatal 4-5 year age 8-9 year age	Child's gender Maternal age Marital status Family socioeconomic Status	Parent report on the CBCL NPI	The relationships between mother's depressive symptoms and the perceptions of problems in her child are variable over time. Long-term associations and continuities in problem perceptions are discernible.
Pawlby et al., 2011 UK	CIS SADS-L	*Antenatal* 36 w *Postnatal* 3 months 12 months 4 years 11 years 16 years postnatal	Maternal sensivity	Child and Adolescent Psychiatric Assessment (psychopathology)	Antenatal depression increased the risk of maltreatment in the offspring by almost four times. Children exposed only to antenatal depression or only to childhood maltreatment were no more at risk of developing psychopathology; however, children exposed to both antenatal depression and childhood maltreatment were at almost 12 times greater risk of developing psychopathology than offspring not so exposed.

Korhonen et al., 2011 Finland	EPDS	*Antenatal* 3rd trimester *Postnatal* 2 months 16-17 years	Mother's education Marital status Number of children Adolescent's gender Maternal age	CBCL YSL (Youth self report	Maternal concurrent depressive symptoms were associated with adolescent behavioural and emotional problems in both genders. Maternal prenatal depressive symptoms were associated with Externalizing Problems in the YSR and boys' lower Social Competence in both the CBCL and YSR. Maternal postnatal depressive symptoms were associated with boys' lower Social Competence both in the CBCL and YSR and Externalizing Problems in the YSR.
Perry 2011	EPDS	Antenatal *Postnatal* 6-8 weeks	Depressive symptoms during pregnancy Pregnancy intention, Feelings about the pregnancy Quality of the partner relationship	Maternal Postnatal Attachment Scale	The strongest predictor of lower maternal attachment was depressive symptoms late in pregnancy; pregnancy intention was marginally predictive of attachment, with lower scores being associated with unwanted pregnancies.
Wojcicki et al., 2011 USA	EPDS CES-D MINI	*Antenatal* 2^{nd}-3^{rd} trimester *Postnatal* 4-6 weeks 6 months 12 months 24 months postnatal	Infant birth weight Birth weight-for-length Any breast-feeding at 6 months of age Maternal postnatal (12–24 months) BMI Maternal ethnicity Maternal age Gestational age	Weight for length Weight for age	Exposure to chronic maternal depression was associated with underweight and with reduced weight gain in the first 2 years of life compared with unexposed infants or infants exposed to episodic depression. Exposure to chronic depression was also associated with reduced risk for overweight in the first 2 years of life.
Ertel 2010	EPDS	*Antenatal* Mid-pregnancy *Postnatal*		SS + TR for overall adiposity SS : TR ratio for central adiposity	In multivariable models, antenatal depression was associated with lower child BMI z-score, but higher SS: TR. There was no evidence of a dose–

		6 months			response relationship between antenatal depression and these outcomes. Postpartum depression was associated with higher SS + TR.
McGrath 2008	EPDS CES-D PDPI-R	*Antenatal* 3rd trimester *Postnatal* 2 months 6 months	Histories of maternal abuse Prenatal anxiety	CHQ	Mothers' reports of infant temperament were significantly different for depressed and non-depressed mothers, with depressed mothers reporting more difficult infants at both measurement points. There were no significant differences in childcare stress or perceived support between the groups. Infant temperament and childcare stress did not change over time.
Rahman et al., 2004	SCAN	*Antenatal* 3rd trimester *Postnatal* 2 months 6 months 12 months	Birth weight and Socioeconomic status Infant sex Low birth weight Duration of exclusive breast-feeding Maternal age Low maternal body mass index Each parent's education Number or children Nuclear family	Episodes of diarrhoea Acute respiratory infections	Infants of prenatally depressed mothers showed significantly more growth retardation than controls at all time points. The relative risks for being underweight were 4.0 at 6 months of age and 2.6 at 12 months of age, and the relative risks for stunting were 4.4 at 6 months of age and 2.5 at 12 months of age. The relative risk for 5 or more diarrheal episodes per year was 2.4. Chronic depression carried a greater risk for poor outcome than episodic depression. The associations remained significant after adjustment for confounders by multivariate analyses. Infants exposed to both prenatal and postnatal depression had poorer growth until age one with those exposed to chronic maternal depression at greater risk

					than those exposed to episodic depression.
Medhin et al., 2010	SRQ-20	*Antenatal* 3rd trimester *Postnatal* 2 months 6 months 12 months	Household characteristics Child characteristics Maternal characteristics Early infant feeding practices	Infant weight Infant length	In bivariate analysis antenatal CMD which had resolved after delivery predicted underweight at twelve months. There were no other statistically significant differences in the prevalence of underweight or stunted infants in mothers with high levels of CMD compared to those with low levels. The associations between CMD and infant nutritional status were not significant after adjusting for pre-specified potential confounders
Ross et al., 2011	SRQ-20	*Antenatal* 3rd trimester *Postnatal* 2 months	breast feeding practices hygiene the infant's vaccination status impaired maternal functioning	Maternal report of infant illness episodes in first 2 months of life	Persistent perinatal CMD symptoms were associated with 2.15 times increased risk of infant diarrhoea in a fully adjusted model. Persistent perinatal CMD was not associated with infant ARI or fever after adjusting for confounders.

Affective Disorders and Schizophrenia (SADS-L)
Brief Disability Questionnaire (BDQ)
Centre for Epidemiological Studies Depression Scale CES-D
Child Behaviour Checklist (CBCL)
Childbearing Health Questionnaire (CHQ)
Clinical Interview Schedule (CIS)
Infant-Toddler Social and Emotional Assessment (ITSEA)
Neonatal Behavioural Assessment Scale (NBAS)
Neonatal Perception Inventory (NPI)
Peabody Picture Vocabulary Test (PPVT)
Perceived Stress Scale (PSS)
Schedules for Clinical Assessment in Neuropsychiatry (SCAN)
Standardised Assessment of Personality— Abbreviated Scale SAPAS)
State-Trait Anxiety Inventory (STAI)
Structured Clinical Interview for *DSM-IV* Axis I Disorders Non-Patient Edition (SCID-I NP)
Structured Clinical Interview for *DSM-IV* Personality Disorders (SCID-II)

The Predictors of Postpartum Depression Inventory – Revised (PDPI-R)
Sum of subscapular and triceps skinfold thickness (SS + TR)
Wide Range Achievement of Visual Motor Abilities (WRAVMA)
Youth self report (YSL)

CHAPTER B METHODS

B. 1 Aims and Hypotheses

The study consisted of a sample of Turkish women recruited at baseline in their third trimester of pregnancy and followed at 2, 12 and 18 months postpartum. Funding was obtained from two Wellcome Trust fellowships awarded to the author: a Masters Fellowship which included support for assessments at baseline and 2 months postpartum, and a PhD Fellowship applied for while baseline interviews were still underway and supporting the additional interviews at 12 and 18 months. The initial Masters Fellowship supported investigations of social correlates of antenatal depression and predictors of onset and maintenance between the antenatal and 2-month postnatal periods. The PhD Fellowship supported investigations of perinatal depression as a predictor of changes in social support and of child development at 18 months. Both additionally sought to investigate traditional vs. nuclear family structure as a potential modifier of these associations.

The principle objectives of the study were therefore as follows:

1. To investigate factors associated with antenatal and postnatal depression in Turkish women: in particular focusing on social support from their husband, mother and mother-in-law, and to investigate the role of nuclear and traditional family structures in modifying these associations.
2. To investigate the association between depression and subsequent changes in these levels of social support over the perinatal period.
3. To investigate the association between antenatal or postnatal depression and child development

The following hypotheses were tested:

1. Antenatal depression will be associated independently with reduced reported social support (i.e. lower emotional and practical support, and increased reported negative aspects of the index relationship) from the husband, mother and mother-in-law.
2. Lower reported social support (emotional support, practical support and negative aspects) from the husband, mother and mother-in-law in the antenatal period will be associated with increased incidence and maintenance of case-level depressive symptoms into the postnatal period.
3. On the assumption that traditional families will provide some buffering of the index relationships through a wider social network, the strength of association between antenatal social support, particularly that from the husband, and ante- and postnatal depression will be stronger in nuclear family settings than in traditional family settings.
4. Antenatal (baseline) depression will be associated with a more marked subsequent deterioration in social support over the perinatal period.
5. Antenatal and postnatal depression will be associated with more delayed child development at 18 months.

B. 2 Study design, setting and recruitment sites

Ankara was felt to be a particularly appropriate setting for the study because of the considerable and longstanding heterogeneity of the population in terms of traditional Middle Eastern or 'modern' Western lifestyle and social environment. 'Ankara' for this study and administratively in Turkey includes both urban and semi-rural locations with a mixture of nuclear and traditional family settings. In common with other Turkish cities, it has experienced rapid expansion and in-migration. Many young women living in urban regions have migrated as students or working adults and live a long distance away from their parents. On the other hand, in the surrounding more rural areas, women are more likely to be living close to their family with traditional ties and expectations. The study therefore sought to capture populations at both extremes of the current process of socio-cultural change.

Research ethics clearance

The study was approved by the ethics committee of Ankara University School of Medicine and the Research and Ethics Review Committee of the Institute of Psychiatry, KCL. The official permission to carry on this study was obtained from the Health Ministry of Turkey. All participants gave their informed consent to participate in the study. Illiterate participants and those lacking capacity to provide consent were not included the study. The interviewers countersigned as witness on the document.

Sampling units

Mother & Child centres were chosen for the study as the optimum sampling sites because these are widely used in the antenatal period and, in the context of the study,

provided the most likely means of obtaining a representative sample of women in their third trimester of pregnancy – i.e., the target baseline sample for the proposed cohort study. In total there are 18 Mother & Child centres in the urban area of Ankara and 14 in surrounding but accessible semi-rural regions. These centres are government run and serve the general population with free access to antenatal and vaccination programmes as part of standard Turkish primary health care services. Usual clinic attendance is at around 32 weeks of pregnancy. Vaccination rates, also provided by these centres, are high for child populations in Ankara with attendance for measles and BCG vaccination 93% and 92% respectively [http://www.saglik.gov.tr]. The initial plan was to sample equal numbers of urban and semi-rural centres in order to maximise the power to investigate effect modification by family structure (assuming that nuclear and traditional family structures would predominate in urban and semi-rural areas respectively), and also to increase the distribution in the sample of other social factors. Although at the start of the study 10 urban and 10 rural centres were selected at random to comprise the sampling frame, there were many attendees in some centres but very few in others. Furthermore, during recruitment it was realised that these centres did not capture the whole Ankara population. Therefore, it was decided also to include one university hospital (Ankara University School of Medicine Gynaecology and Obstetric Department) and one gynaecology and obstetrics hospital (The Ministry of Health Zekai Tahir Gynaecology and Obstetrics Hospital) as recruitment centres and, in order to improve recruitment and increase statistical power, accept the fact that the centres would be a convenience rather than random sample. There are a total of five university hospitals which run gynaecology and obstetric services. There are also three state gynaecology and obstetrics hospitals which mainly serve the general population in

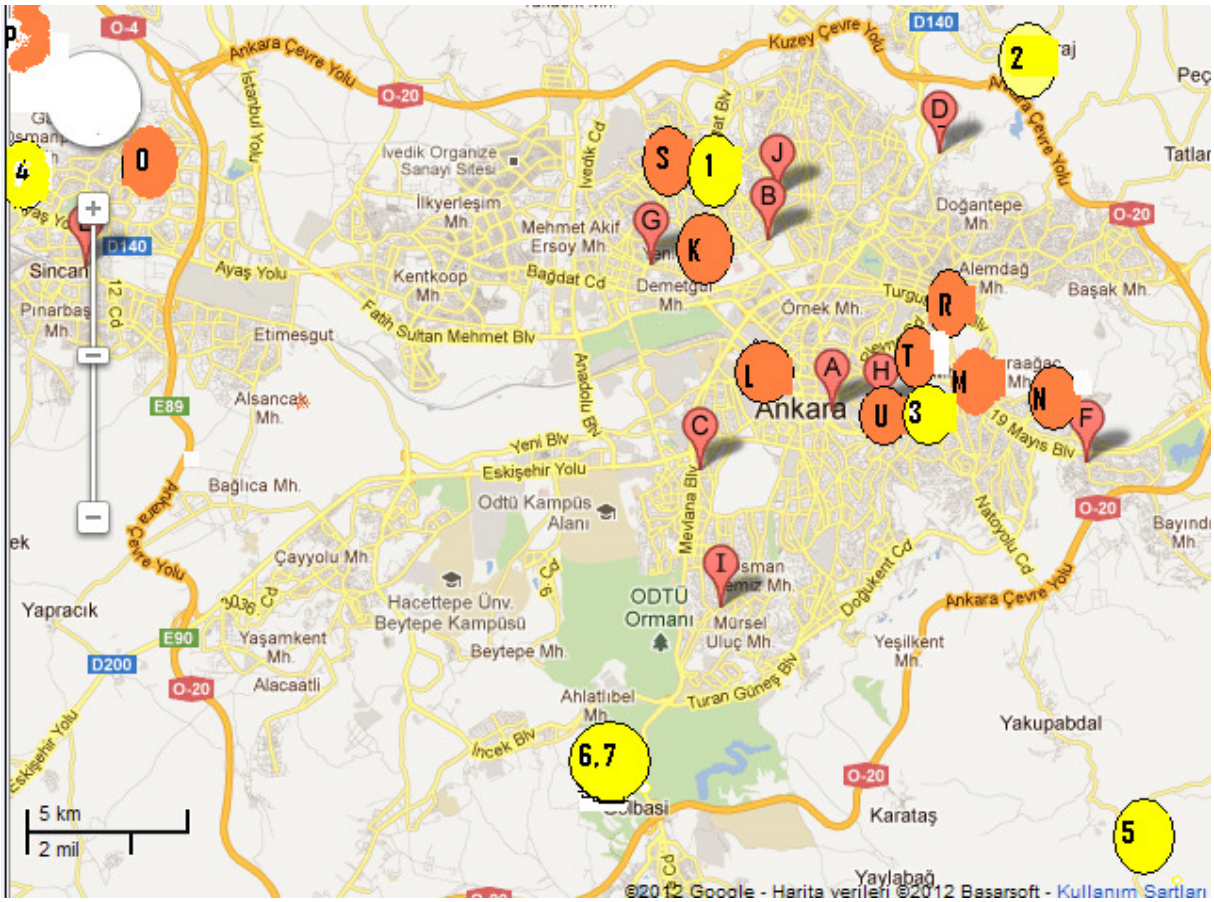
antenatal and postnatal periods. These hospitals are also usually used for hospital deliveries.

Distribution of sampling

The numbers of referrals varied between centres. There are couple of reasons for this. Firstly, public health politics had been changing over the preceding 10 years, and some centres were closed or closing. Secondly, personal choices play a role. Some women prefer to attend to hospital instead of a mother and child unit due to the quality of health services. Thirdly, the availability of services and the choice offered are different in and around Ankara. Within central Ankara, women may choose to attend a mother and child unit or a hospital whereas these options would be less in more peripheral areas.

Despite this variation, it was possible to estimate likely numbers of referrals. For example, daily attendances at the Zekai Tahir Gynaecology Hospital and the Ankara University Gynaecology Clinic numbered around 400 and 100, respectively. The Sincan Mother and Child unit is another busy centre with approximately 50 pregnant women attending daily. Interviewers had observed each centre during the first week of the study and had projected approximate attendance numbers. It was observed that the referral number to some centres was very low (<5 per week) and, because of this, the recruitment was stopped from these centres following discussions between the research team and the candidate, with further surveillance in case of a later increase in attendance. The distribution and contributions of centres to the sample are displayed below.

Figure B.1: Distribution of Mother & Child centres in Ankara



Key to Figure B.1

Mother & Child centres contributing to the sample

A KURTULUS (number recruited 8)

B ETLİK (19)

C BALGAT (2)

D ALTINDAĞ (4)

E SINCAN (off map; 232)

F KARABAYIR (15)

G. YENİMAHALLE (42)

H AKDERE (2)

I. DİKMEN (3)

J. İNCİRLİ (14)

K DEMETEVLER (11)

L SIHHİYE (29)

M AKTEPE (6)

N MAMAK (44)

O BATIKENT (4)

P GUDUL (off map; 2)

R GULVEREN (off map; 66)

S KALETEPE (off map; 20)

T Ankara University School of Medicine Gynaecology and Obstetric department (92)

U Ministry of Health Dr. Zekai Tahir Obstetric Hospital (147)

Mother & Child centres in and around Ankara not included in the sample

1 ŞENTEPE

2 Number 2 Mother & Child centre (no specific name)

3 ÇALIŞKANLAR

4 AYAS (off map)

5 BALA (off map)

6 GOLBASI (off map)

7 GÖLBAŞI (off map)

8 HAYMANA (off map)

9 KIZILCAHAMAM (off map)

10 POLATLI (off map)

12 SEREFLIKOCHISAR (off map)

B. 3 Participants

Baseline samples were therefore drawn from urban and semi-rural antenatal clinics, one university and one state obstetric hospital in Ankara in central Turkey. Attempts were made to interview all attendees for routine third trimester antenatal examinations within the study period from December 2007 to August 2008 in these participating centres and clinics. Research team members attended centres and invited pregnant women to the study. Having obtained the baseline sample, attempts were made to re-contact and interview previous participants as close as possible to 2, 12 and 18 months after their childbirth. Apart from refusal and clear permanent loss to follow-up (e.g. change of address and non-locatable), non-participation at one follow-up interview did not preclude an attempt to re-contact for a later one.

The power calculation for the first Wellcome Trust application (Masters fellowship, funding baseline antenatal and 2 month postnatal examinations) read as follows: *Assuming a prevalence of 25% for Edinburgh Postnatal Depression Scale (EPDS) caseness at baseline (a conservative estimate, given previous findings for postnatal caseness in Turkey of >30%), a maintenance rate of 30% at 2 months postpartum and a follow-up rate of 80% in the case-level group, a sample size of 750 will allow the detection of a 0.5 SD group difference in mean score for a given quality of relationship measure between maintained and non-maintained groups at 80% power (alpha 0.05, 2-sided test) – i.e. a moderate effect size. At the same level of power, this sample size will allow the detection of a 0.3 SD group difference between participants with and without depression at baseline (assuming a more conservative 13% prevalence), and a 0.6 SD*

group difference between incident and non-incident EPDS caseness at 2 months post-partum (assuming an incidence rate of 5%).

The power calculation for the second Wellcome Trust application (PhD fellowship, extending the study to include 12- and 18-month follow-up of mothers and infants) was predicated on this baseline sample of 750 (as the application was made before completion of baseline interviews) and was worded as follows: *Assuming a 30% loss to follow-up over the 18 month additional period, this sample would allow a 0.3 SD effect size to be detected at 90% power (alpha 0.05, 2-sided t-test) for either change in relationship quality or infant growth / development between participants with or without case-level depression at baseline, assuming 25% prevalence of depression and that outcomes can be transformed to normal distributions.*

Participants were approached and interviewed at baseline when they attended Mother & Child centres for routine checks in pregnancy. Follow up interviews, on the other hand, were held at participants' homes. Baseline interviews lasted approximately one hour, the first follow-up 30 minutes, the second follow-up 45 minutes, and third follow-up 1 hour.

B. 2. 4 Measurements

Interviews were carried out by research workers, trained and supervised by the candidate. Research workers were mainly graduate psychologists. There was also one interviewer who had graduated from a linguistics department, one nurse, and one

psychology counsellor. The choice of measurements took into consideration the need for relatively brief instruments, particularly for baseline assessments which were carried out at the time of clinic attendance. Schedules for the four examinations throughout the study were kept as similar as possible with no alteration in the measurement of core constructs. The following information was gathered at each examination, unless stated otherwise:

Age: Reported age of participants was recorded at baseline. Age was categorised into 4-year groups based on its distribution and this was entered in the main analyses as a categorical variable.

Years of education: Self reported duration of education of participants was recorded at baseline. Years of formal education was categorised into 4 groups based on its distribution and this was entered in the main analyses as a categorical variable.

Marital status: Marital status was grouped into the following categories: married, widowed, divorced, separated or single. However, since almost all (97.8 %) participants were married and cohabiting with their husband, this variable was not considered as a covariate.

Family income: Self reported family income was recorded. Level of income was categorised into 4 groups based on its distribution and this was entered in the main analyses as a categorical variable.

Current physical health: Self reported information was collected on the presence any chronic physical illness or health complaint using two different questions. It was a binary variable checked as yes if there was any complaint. Self reported general physical health was also enquired about and categorised into five groups: very good, good, average, poor and very poor. Most of the sample did not report any chronic illness or health complaints (84.9% and 82.5% respectively) and therefore only the general physical health variable was used in the analyses.

Previous mental health: Information was collected on the presence of any diagnosed psychiatric illness in the past. This was a binary variable checked as yes if there was any self-reported previous diagnosis of depression, other psychiatric illness or emotional problems in the past. Family psychiatric history was also enquired about.

Life stressors: Participants were asked about the presence of the following life stressors/events within the last 12 months (Norbeck 1984): being in debt, hunger from lack of food, recent separation, problems with friends, recent illness/injury, domestic violence, serious illness in a relative, death of a close family member, death of another relative, problems with a job, problems with money, problems with the justice system, any robbery. Totalled number of recent life stressors were categorised into 4 groups as 0, 1, 2, and 3 or more.

Number of children: Responses were categorised into having no child, having 1 child and having 2 or more children.

Index child health: In postnatal examinations, mothers were asked to rate the health of the index child within the following categories: very good, good, average, poor, and very poor. For analyses, this information was condensed into 3 groups: very good, good and average or poor/very poor.

Family structure: As described above, family structure was conceptualised as a potential effect modifier for analyses and was applied as a binary variable, categorising households into nuclear or traditional/extended family structures. A nuclear family structure was defined as a wife and husband living alone or with their children in the same household, whereas a traditional/extended family structure was defined if another adult was living with the married couple in the same household. In Turkish society this would nearly always be the mother-in-law or father in-law of the woman.

Quality of relationships and social support

The Close Persons Questionnaire (CPQ, Stansfeld and Marmot 1992) was translated and adapted for this purpose. This questionnaire was designed to include questions on both social network and quality of social support to capture different aspects of support, but only the quality subscales were used in this study as described below. Although this instrument has been used widely in international research, it did not appear to have been used previously in a Turkish population. The instrument was therefore prepared by the candidate through an iterative process of translation and back-translation with independent review (by a Psychologist and Psychiatrist) of construct validity and equivalence.

The CPQ includes a 15-item scale ascertaining participants' perceptions of three types of support from a nominated person nominated: a) confiding/emotional support, b) practical support, and c) negative aspects of close relationships (Stansfeld and Marmot, 1992). In conventional use of the measurement, the participant is asked to nominate the person (or 2-4 persons) closest to them and the scale is then used to infer an overall picture of social support based on that or those closest relationship(s). The study described here deviated from this protocol and applied/imposed the scale to three relationships anticipated *a priori* to be the most importance for Turkish women in their perinatal period: i.e., the husband, the mother and the mother-in-law. Data were coded as missing on these sections if this information could not be obtained (e.g. if the mother or mother-in-law was deceased). In other respects, all aspects of the scale were applied in the standard way.

Each item of the CPQ is evaluated on a Likert scale from 1 (not at all) to 4 (a great deal), and the total score of each support type is summed and interpreted separately.

- 'Confiding/emotional support' is an 8-item subscale measuring wanting to confide, confiding, sharing interests, boosting of self-esteem and reciprocity. The total score range is 8-32.
- 'Practical support' is a 3-item subscale measuring major and minor practical help received. The total score is 3-12.
- 'Negative aspects of the relationships' are measured on a 4-item subscale measuring negative interaction and perceived inadequacy of support from the close person. The total score is 4-16. This is the only support type with reverse meaning in interpretation, i.e. higher score indicates more negative interaction and less perceived support from close relationships.

Depression

In a recent meta-analysis of 159 perinatal depression studies, 24 different measures were found to have been used, with the most common being the Centre for Epidemiological Studies Depression Scale (31.4%), the Edinburgh Postnatal Depression Scale (18.2%), and the Beck Depression Inventory (17.0%). In summary, the Edinburgh Postnatal Depression Scale (EPDS, Cox et al 1987) was chosen for this study as one of the most widely used screening instruments for perinatal depression internationally and the most commonly used in Turkish research (as described below). Although it has been principally applied to assess postnatal depression, it has also been used for antenatal depression (Gaynes et al. 2005), and has found to have better screening properties than generic instruments such as the Beck Depression Inventory (Gaynes et al 2005), because of the focus on cognitive features of depression and the avoidance of questions on symptoms such as somatic complaints and sleep disturbance which are problematic as diagnostic items in the perinatal period (Cox et al 1987). The EPDS consists of ten short statements presented to the participating woman, who indicates which of four possible responses for each is closest to how she has been feeling during the previous week. The scale does not detect mothers with anxiety neuroses, phobias or personality disorders. The maximum score is 30.

There has been debate around the most appropriate methods for ascertaining perinatal depression. However, if the complexities of translation, literacy levels and familiarity with test taking are considered, it has been suggested that the EPDS may be used with caution cross-culturally as a screening instrument for emotional distress warranting additional professional assistance (Laungani 2000) It has also been argued that there are

benefits in trans-cultural settings of assessing symptoms rather than attempting to form diagnoses, because these are a more accurate reflection of individual experience and reduce the likelihood of over- or under-estimates of prevalence of a diagnostic entity that may not be culturally meaningful. Although initially developed in the UK (Cox et al 1987), the EPDS has subsequently received wide international validation and application (e.g. Harris et al 1989, Ghubash et al 1997 , 8, 9,10), and has also been the most widely applied measure in previous Turkish research into perinatal mental disorder (Inandi et al, 2005, Bugdayci et al 2004). The reliability and validity study of the scale in Turkish was established by Aydın et al (2004) using the SCID as a gold standard, finding sensitivity and specificity of 0.76 and 0.71 respectively, and a Cronbach's alpha value of 0.72. In another validation study in Turkey by Engindeniz (1996), sensitivity was found to be 0.84 and specificity 0.88. In both studies, the applied cut-off point of EPDS was 13 (i.e. caseness defined on the basis of scores ≥ 13). The EPDS has also been validated as a screening tool for antenatal depression in pregnant women (Gibson et al., 2009). For the study described here, as suggested in previous validation studies carried out in Turkey (Aydin et al 2004), a score of 13 or above was used to classify case status for both antenatal and postnatal period. Although recommended cut-off points have varied, the study by Aydin et al. (2004) was optimally designed for instrument validation, and almost all studies, apart from two, which have been conducted in Turkey, have used the EPDS ≥13 cut-off (Table A.8). In our study, this instrument was self-completed by participants, as illiterate women (rare in the setting of interest) were excluded at baseline.

Child development

The child's weight at birth and the three subsequent examination points was obtained from routine records and/or measuring by interviewers. Length also was measured at 2, 12, and 18 months. Child development was assessed by the Guide for Monitoring Child Development (GMCD; Ertem et al., 2008) which was designed specifically for use by healthcare providers in low- and middle-income countries, and studies in Turkey have provided initial supporting evidence for its reliability and validity (Ertem et al., 2008). It aims to aid clinicians in monitoring and supporting child development and in the early detection and management of developmental difficulties. The developmental milestones from five previously standardized and validated developmental screening or assessment instruments: Denver II (Frankenburg et al., 1992), Vineland (Sparrow and Cicchetti., 1985), Brigance Screening Test (Glascoe et al., 1996), Ages and Stages Questionnaire (Bricker et al., 1995), and Bayley Scales of Infant Development Second Edition (Bayley II) (Bayley 1993) are pooled in this scale. Three experts in child development selected milestones that could be easily observed and reported by caregivers in response to the GMCD questions and that were thought to be universal and not culture specific. A pilot study was conducted to assess the appropriateness and comprehension of the questions and milestones (Ertem et al., 2008).

There are seven domains in GMCD which are: a) family concerns about the child development; b) expressive language and communication; c) receptive language; d) fine and gross motor function; e) relationship; f) play (social and emotional, cognitive); g) self-help skills (for children older than 12 months). For each of the above domains, there are specific pre-coded milestones. The caregiver's spontaneous responses to the open-ended questions are applied to the milestones wherever possible. It is allowed to ask additional questions when necessary to prompt responses to specific milestones.

Regarding 18 month assessment, GMCD does not include specific questions for a cognitive domain, because for young children it is difficult for a caregiver to narrate aspects of cognitive development separately from language, relating, and play skills. Cognitive development is covered in the other questions and through the first question which specifically asks if the caregiver is concerned about the child's cognitive development, using explanations such as "thinking," "using his mind," and "intelligence." The GMCD form is composed of 2 tables provided on each side of one single sheet. The questions are placed in rows, the 8 age ranges (1–3, 4–5, 6–7, 8–10, 11–13, 14–16, 17–19, and 20–24 months) are placed in columns, and the developmental milestones are in the cells.

Three studies have been conducted in Turkey on the construction and psychometric properties of the GMCD in children aged 0–24 months, which were published in one paper (Ertem et al., 2008). These studies aimed to determine the ages of attainment of the GMCD milestones, to examine ease of administration and inter-rater reliability, and to examine concurrent validity of the GMCD with a comprehensive developmental assessment in study 1, 2, and 3 respectively. Inter-rater reliability was investigated between medical students and a child development specialist administering the guide in two clinical samples. The concurrent validity of the guide administered during a health visit was assessed against a comprehensive developmental assessment. Inter-rater reliability between the student pairs (agreement: 93.4%; $\kappa = 0.84$; $p<0.001$) and between the child development specialist and the students (student 1: agreement: 94.5%; $\kappa= 0.88$; $p<0.001$; student 2: agreement: 92.3%; $\kappa = 0.83$; $p<0.001$) were high. For between-student pairs, the κ value was 0.79 ($p<0.001$) for caregivers with a primary school education or less and 0.93 ($p<0.001$) for caregivers with at least a secondary

school education. Item-total scale correlations ranged from 0.29 to 0.91; 84% of the 89 milestones had item-total correlations 0.40. Internal consistency measured by the Cronbach's was high, ranging from 0.80 to 0.96 for each of the 6 domains and was 0.95 for the total score. Sensitivity and specificity were 21 of 24 (0.88; 95% CI: 0.69–0.96) and 51 of 55 (0.93; 95% CI: 0.83–0.97), respectively, which represent "good" and "excellent" levels of diagnostic accuracy. Based on this clinic sample, predicted positive accuracy value of 0.84 and a predicted negative accuracy value of 0.94 were obtained. (Ertem et al., 2008)

Variables applied in analyses are summarized in Table B.1.

Table B.1 Summary of variables used in the study		
Age	4 groups based on its distribution	1= 18-22 2= 23-25 3= 26-29 4= 30-44
Years of education	4 groups based on its distribution	1= ≤5 2= 6-8 3= 9-11 4= ≥12
Family income	4 groups based on its distribution (Turkish Lira)	1= ≤630 2= 631-900 3= 901-1400 4= 1401-23000
Current physical health	3 groups based on its distribution	1= Very good 2= Good 3= Average/bad/very bad
Stressful life event in the last 6 or 12 months (see below)	4 groups based on its distribution for baseline assessment 3 groups based on its distribution for follow-up assessments	1= 0 2= 1 3= 2 4= 3 or more 1= 0 2= 1 3= 2 or more
Previous mental health problems	2 groups	1=No 2=Yes
Number of children	3 groups based on its distribution	1= No child 2= Having 1 child 3= 2 or more children
Index child health	3 groups based on its distribution	1=Very good 2=Good 3=Average or worse
Family structure	2 groups	1=Nuclear 2=Traditional
Depression (EPDS)	Cut off point of 12/13 applied	1=EPDS<13 2=EPDS≥ 13
Social support (CPQ)	3 subscales treated as	CPQ emotional support

	continuous variables	CPQ practical support CPQ negative aspect
GMCD	7 subscales and total score applied as continuous variables	1. Family's concern about the child development; 2. Expressive language and communication 3. Receptive language 4. Fine and gross motor 5. Relationships 6. Play (social and emotional, cognitive) 7. Self-help skills

B. 2. 5 Follow-up assessments

Measurements applied at each assessment were as follows:

Examination 1 (baseline; third trimester of pregnancy)

Sociodemographic factors such as age, education, marital status, income, and number of children.

Life events during last 6 months were asked.

Social support (CPQ).

Depression (EPDS).

Examination 2 (2-6 months postnatal)

Sociodemographic factors which might have been changed since the first interview such as marital status.

Life events since birth

Social support (CPQ).

Depression (EPDS).

The child's weight and length at birth and 2-6 months were recorded.

.

Examination 3 (12-16 months postnatal)

Sociodemographic factors which might have been changed since Examination 2.

Life events since Examination 2.

Social support (CPQ).

Depression (EPDS).

Examination 4 (18-20 months postnatal)

Sociodemographic factors which might have been changed since Examination 3.

Life events since Examination 2.

Social support (CPQ).

Depression (EPDS).

The child's weight and length 18-20 months were either extracted from current records or measured by the interviewer.

Child development (GMCD)

B. 2. 6. Data collection

Ten graduate-level research workers carried out baseline assessments. In the follow-up assessments, four, four and three interviewers were employed for the first, second and the last visits respectively. The author was responsible for training all interviewers and carried out quality control and reliability checks throughout the study by direct observation. In order to maximise follow-up rates and minimise attrition, participants were asked to provide contact details for two close others at baseline. Data were recorded on paper and were double-entered on to computer by a clerical assistant during the course of data collection using EPI DATA software.

B. 3 Statistical analyses

Statistical analyses are described in detail within each of the four results sections in Chapter C. However, broad principles were as follows: i) For analyses of hypotheses 1-3 (C.1, C.2), social support measures were modelled as dependent variables in linear models, entering EPDS caseness as the principal independent variable with adjustment for covariates chosen *a priori* and statistical interaction terms tested with nuclear/traditional family structure; ii) for analyses of hypothesis 4 (C.3), mixed models were used modelling social support measures over the four examinations as dependent variables with baseline EPDS caseness, time and an interaction term between the two as principal independent variables; iii) for analyses of hypothesis 5 (C.4), child development measures were modelled as dependent variables with previous/concurrent EPDS caseness as principal independent variables, and exploratory analyses investigating social support as an additional exposure.

B. 4 Samples and follow-up

Of the 772 women approached in their third trimester, 751 (97.3%) participated in the study. The reasons for non-participation were: refusal (n=18) and insufficient literacy (n=3). A further 31 incomplete questionnaires had to be excluded. Therefore, of those approached, 730 (94.6%) participants were included with sufficient data for this analysis. The numbers of participants with complete data on the emotional support, practical support and negative aspects measures were 665, 670 655 for the mother respectively and 635, 649 and 633 for the mother in-law respectively. All 730 had data for the spouse relationship.

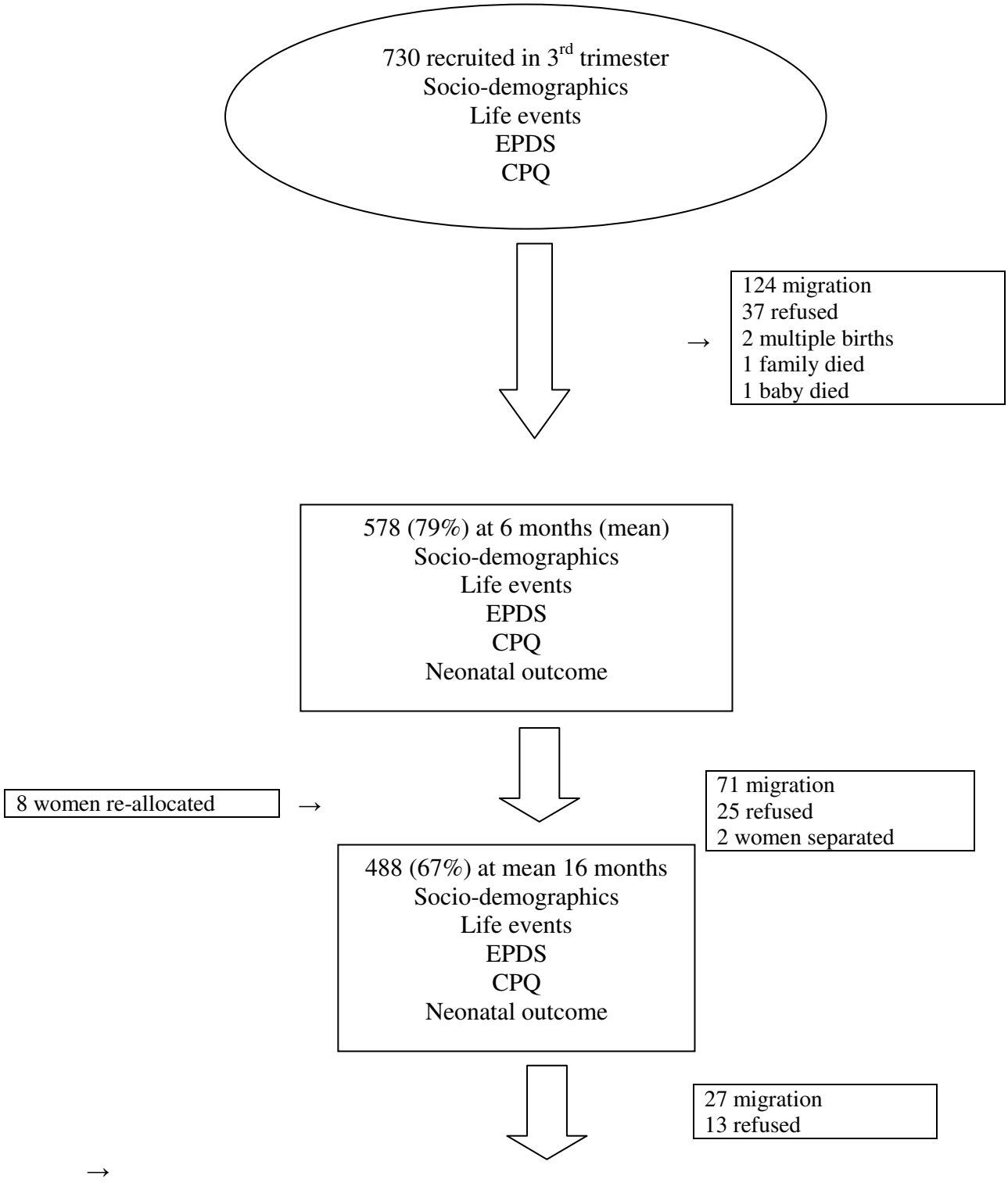
Of these 730 participants assessed in their third trimester, 578 (79%) were reassessed in the first examination after childbirth. The main reason for loss to follow-up (17%) was migration of families due to re-allocation of housing in certain areas around that time and consequent loss of contact. Thirty seven (5%) previous participants refused a follow-up assessment. Two mothers gave birth to twins and were not followed. One family died in a road traffic accident and one baby died due to a health problem. The aim had been to carry out assessments at 2 months postpartum. However, due to logistical issues, the mean (SD) timing was 4.1 (3.3) months after birth.

Of the original 730 participants, 488 (67% of the baseline sample, 83% of the sample at first follow-up) were reassessed at the second follow up. As with the first follow-up examination, the main reason for attrition was out-migration due to re-allocation of housing in certain areas. Twenty five previous participants refused a follow-up assessment. Eight women were included who had participated at baseline but not at the

first follow-up. One woman was divorced and one woman had separated from her spouse. The aim had been to carry out this assessment at 12 months postpartum; however the mean (SD) time since birth was 13.7 (2.9) months.

In the third follow-up examination, 448 (61% of the total sample, 92% of participants at the second follow-up) mothers participated. Twenty seven previous participants had moved away and 13 refused a follow-up assessment. The aim had been to carry out this assessment at 18 months postpartum; however the mean (SD) time since birth was 20.8 (2.7) months.

Follow chart of study



448 (61%) at mean 20 months
Socio-demographics
Life events
EPDS
CPQ
GMCD

CHAPTER C RESULTS

CHAPTER C.1 Social support and antenatal depression in extended and nuclear family environments

C.1.1 Objectives

These analyses sought to describe the prevalence of antenatal depression in the sample and to address study hypotheses 1 and 3 (B.1) through investigating the cross-sectional associations between social support measures and antenatal depression and the extent to which these differed between nuclear and traditional family settings.

C.1.2 Statistical analyses

Although caseness on the EPDS was the primary 'outcome', in order to make use of the continuously distributed data on social support, the CPQ subscales were treated as dependent variables (i.e. testing and modelling the differences in social support scale means between cases of depression and controls) using t-tests initially to investigate significance and then linear regression models to adjust for covariates. Following consultation with statistical colleagues, the sample size was felt to be sufficient to justify this approach of linear modelling, despite non-normal CPQ subscale distributions. Stratified analyses were used to investigate effect modification by family structure with interaction terms re-tested in linear regression models. In a more exploratory analysis, effect modification by the presence or not of previous childbirth was investigated in a similar way through separate models.

C.1.3 Sample characteristics

Distributions of covariates are summarised in the first column of Table C.1.1. The mean age was 25.9 years (SD 5.3, range 18-44), and the mean duration of education was 8.4

years (SD 4.5, range 1-34). Almost all participants were living with their husband and close to a third (29%) were living in traditional family environments. Over half (54%) had no children. The majority described their physical health as at least good, although emotional problems in the past were reported by around half of the sample and the prevalence of reported violence in the last 12 months was 5.9%. Around a third (33.1%) had depression according to the EPDS≥13 cut-off point.

C.1.4 Associations between covariates and depression

Unadjusted associations with depression are summarized in the remainder of Table C.1.1. Depression was associated with higher numbers of previous children, worse general health, previous/current life events/stressors, and self-reported past history of emotional problems. There were no significant associations with age or education level. Depression was associated with lower family income, although only at borderline significance levels.

Table C.1.1 Unadjusted associations between participant characteristics and prevalence of case-level depressive symptoms

	n	Depression prevalence (%)	Odds ratio (95% CIs)	χ^2 (df), p-value
Age				0.03 (1) p=0.86
18-22	199	33.7	Reference	
23-25	166	37.3	1.18 (0.76-1.81)	
26-29	172	25.0	0.66 (0.42-1.03)	
30-44	168	36.9	1.15 (0.75-1.77)	
Number of children				4.90 (1) p=0.03
0	379	31.4	Reference	
1	230	29.6	0.92 (0.64 – 1.31)	
≥2	111	45.9	1.86 (1.21 – 2.86)	
Education level (year)				0.14 (1) p=0.71
≤5	229	32.3	Reference	
6-8	143	32.9	1.03 (0.66 – 1.60)	
9-11	240	34.2	1.09 (0.74 – 1.60)	
≥12	82	26.8	0.77 (0.44 – 1.35)	
Family income (TRY)				3.09 (1) p=0.08
≤630	169	36.7	Reference	
631-900	172	36.0	0.97 (0.63 – 1.51)	
901-1400	243	29.6	0.73 (0.48 – 1.10)	
1401- 23000	93	29.0	0.71 (0.41 – 1.22)	
Physical health				9.33 (1) p<0.001

Very good	129	30.2	Reference	
Good	446	29.6	0.97 (0.63 – 1.49)	
Average/bad/very bad	142	47.2	2.06 (1.25 – 3.40)	
Life events/stressors				43.7 (1) p<0.001
0	406	23.6	Reference	
1	174	31.0	1.46 (0.96 – 2.20)	
2	90	43.0	2.45 (1.49 – 4.03)	
3	69	55.0	3.96 (2.02 – 7.77)	
4+	27	70.4	7.70 (3.24 – 18.29)	
Past emotional problems				71.0 (1) p<0.001
No	358	18.7	Reference	
Yes	340	48.8	4.14 (2.95 – 5.82)	
Family structure				0.08 (1) p=0.77
Nuclear	471	32.7	Reference	
Traditional	249	33.7	1.05 (0.76-1.45)	

C. 1. 5 Associations between depression and social support

Differences in social support measures between participants with or without depression are displayed in Table C.1.2. In summary, women with case level depression reported worse social support (lower emotional and practical support, higher negative aspects of relationships) on all nine variables, apart from a lack of association with practical support from the mother. Adjusted associations between depression and social support measures are displayed in Table C.1.3. Adjustment for age had little impact on these, but there were modest reductions in the strengths of association following adjustment for number of children, duration of education, and family income. Further reduction was observed, particularly for the emotional support measures after adjustment for physical health and number of life events/stressors, with little or no subsequent change following adjustment for personal past history of mental disorder. In the final, fully adjusted model, depression remained significantly associated with all three measures of social support from the husband, with lower practical and emotional support from the mother-in-law and with higher negative aspects of the relationship with the mother.

Table C.1.2: Unadjusted associations between social support and depressive symptoms

Nature of support	Mean (SD) social support		Difference (cases vs. non-cases)	
	Non-cases	Cases	Beta coefficient	p-value
	n=482	n=238	(95% CI)	
From husband				
Emotional	27 (4.6)	23.4 (6.1)	-4.0 (-4.8, -3.2)	<0.001
Practical	9.9 (2.0)	8.9 (2.4)	-1.1 (-1.4, -0.7)	<0.001
Negative aspects	10.3 (2.2)	11.8 (2.2)	1.6 (1.2, 1.9)	<0.001
From mother				
Emotional	25.1 (5.3)	23.2 (6.0)	-1.8 (-2.7, -0.9)	<0.001
Practical	8.5 (2.8)	8.4 (3.1)	-0.1 (-0.6, 0.4)	0.62
Negative aspects	9.3 (2.1)	10.0 (2.2)	0.7 (0.3, 1.0)	<0.001
From mother in law				
Emotional	19.9 (6.3)	16.0 (5.8)	-4.4 (-5.5, -3.2)	<0.001
Practical	7.3 (3.1)	6.0 (3.0)	-1.3 (-1.8, -0.8)	<0.001
Negative aspects	9.5 (2.4)	10.3 (2.9)	0.8 (0.3, 1.2)	<0.001

Table C.1. 3 Adjusted associations between social support and depressive symptoms

Nature of support	Association with case-level depressive symptoms (B-value, 95% CI)				
	Unadjusted	Model 1	Model 2	Model 3	Model 4
From husband					
Emotional	-4.0 (-4.8, -3.2)*	-4.0 (-4.8, -3.2)*	-3.7 (-4.6, -2.9)*	-2.9 (-3.8, -2.0)*	-2.6 (-3.6, -1.7)*
Practical	-1.1 (-1.4, -0.7)*	-1.1 (-1.4, -0.7)*	-0.9 (-1.3, -0.6)*	-0.7 (-1.1, -0.3)*	-0.6 (-1.0, -0.2)*
Negative aspects	1.6 (1.2, 1.91)*	1.5 (1.2, 1.9)*	1.5 (1.1, 1.9)*	1.3 (0.9, 1.7)*	1.3 (0.8, 1.7)*
From mother					
Emotional	-1.8 (-2.7, -0.9)*	-1.8 (-2.7, -0.9)*	-1.6 (-2.6, -0.7)*	-1.0 (-2.0, 0.1)	-1.2 (-2.3, 0.2)
Practical	-0.1 (-0.4, 0.6)	-0.1 (-0.6, 0.4)	0.2 (-0.3, 0.6)	0.3 (-0.3, 0.8)	0.3 (-0.3, 0.8)
Negative aspects	0.7 (0.3, 1.0)*	0.6 (0.3, 1.0)*	0.7 (0.3, 1.1)*	0.7 (0.3, 1.1)*	0.7 (0.2, 1.1)*
From mother in law					
Emotional	-4.4 (-5.5, -3.3)*	-4.4 (-5.5, -3.3)*	-4.3 (-5.5, -3.2)*	-3.8 (-5.1, -2.6)*	-2.6 (-4.6, -1.9)*
Practical	-1.3 (-1.8, -0.8)*	-1.3 (-1.8, -0.8)*	-1.2 (-1.7, -0.7)*	-1.0 (-1.5, -0.5)*	-0.8 (-1.4, -0.3)*
Negative aspects	0.8 (0.3, 1.2)*	0.8 (0.3, 1.2)*	0.8 (0.4, 1.3)*	0.7 (0.2, 1.2)*	0.4 (-0.1, 1.0)

*p<0.05

Model 1 Adjusted for age.

Model 2 Adjusted for 1 and number of children, duration of education, family income

Model 3 Adjusted for 2 and physical health, number of life stressors/events

Model 4 Adjusted for 3 and previous emotional problems

C 1. 6 Effect modifications by family structure and previous childbirth

Stratified analyses investigating effect modification are summarised in Table 4. Overall, the only significant evidence for modification lay in the emotional relationship with the husband which was more strongly associated with antenatal depression in traditional compared to nuclear families and in women expecting their first child.

Table C.1. 4: Stratified analysis of associations between social support and depressive symptoms. B-coefficients with 95% confidence intervals are displayed

	Total	Family structure			Current family size		
		Nuclear	Traditional	p-value*	0 child	1+ children	p-value*
		n=471	n=249		n=379	n=341	
From husband							
Emotional	-4.0 (-4.8, -3.2)	-3.2 (-4.2, -2.2)	-5.4 (-6.8, -4.1)	<0.01	-4.7 (-5.8, -3.6)	-3.2 (-4.3, -2.0)	0.05
Practical	-1.1 (-1.4, -0.7)	-0.8 (-1.3, -0.4)	-1.4 (-1.2, -0.9)	0.10	-1.1 (-1.5, -0.6)	-1.0 (-1.5, -0.5)	0.44
Negative aspects	1.6 (1.2, 1.9)	1.6 (1.2, 1.1)	1.4 (0.9, 2.0)	0.58	1.5 (1.0, 2.0)	1.6 (1.1, 2.2)	0.28
From mother							
Emotional	-1.8 (-2.7, -0.9)	-1.5 (-2.6, -0.4)	-2.3 (-3.9, -0.8)	0.37	-1.6 (-2.7, -0.5)	-1.9 (-3.3, -0.5)	0.24
Practical	-0.1 (-0.4, 0.6)	-0.4 (-1.0, 0.2)	0.5 (-0.3, 1.2)	0.07	0.6 (0.0, 1.1)	-0.7 (-1.4, 0.0)	0.10
Negative aspects	0.7 (0.3, 1.0)	0.7 (0.2, 1.1)	0.7 (0.1, 1.3)	0.95	0.6 (0.1, 1.1)	0.8 (0.2, 1.3)	0.18
From mother in law							
Emotional	-4.4 (-5.5, - 3.2)	-4.0 (-5.4, -2.6)	-5.1 (-6.9, -3.3)	0.34	-4.6 (-6.1, -3.0)	-4.0 (-5.5, -2.4)	0.42
Practical	-1.3 (-1.8, -0.8)	-1.3 (-1.9, -0.7)	-1.4 (-2.2, -0.7)	0.74	-1.1 (-1.8, -0.5)	-1.4 (-2.1, -0.7)	0.49

Negative aspects	0.8 (0.3, 1.19)	0.8 (0.2, 1.3)	0.7 (0.1, 1.4)	0.90	0.8 (0.3, 1.4)	0.7 (0.1, 1.4)	0.56

*Testing heterogeneity of regression coefficients between strata

CHAPTER C.2 Social support and the incidence and persistence of depression between antenatal and the first postnatal examinations

C.2.1 Objectives

These analyses sought to describe the course (incidence and persistence) of depression in the sample between the antenatal and first postnatal examination and to address study hypotheses 2 and 3 (B.1) through investigating the associations between antenatal social support measures and the incidence and persistence of depression, and the extent to which these differed between nuclear and traditional family settings.

C.2.2 Statistical analyses

As with C.1 analyses, although EPDS caseness at follow-up was the primary 'outcome', in order to make use of their continuous distribution, the baseline CPQ subscale scores were treated as dependent variables (i.e. testing the differences in baseline social support scale means between participants with/without depression at follow-up) using t-tests initially to investigate significance and then linear regression models to adjust for covariates. Stratified analyses were used to investigate effect modification by family structure with interaction terms re-tested in linear regression models.

Covariates in this analysis were as follows: 1) age, 2) number of living children, 3) education level (four groups), 4) family income (four groups), 5) general physical health (five groups), 6) baseline life stressors/events (applied to the preceding 12 months), 7) past history of emotional problems, and 8) self-reported child health. Family structure was defined as an effect modifier for analyses and was applied as a binary variable, categorising nuclear and traditional/extended family structure.

C.2.3 Sample characteristics

Of 730 participants assessed in their third trimester (95% of those approached), 578 (79%) were reassessed 4.1 (3.3) months after birth. Descriptive data for the followed sample are presented in the first column of Table 1 for key covariates. The sample mean age at baseline was 25.9 years (SD 5.3, range 18-44), and their mean education duration was 8.4 years (SD 4.5). Regarding social structure, 67% lived in a nuclear family. The majority in extended family settings lived with either their mother-in-law (27% of the total sample) or father-in-law (21%) or both. Almost all (97.8 %) participants were married and all of these bar two lived with their husband.

C.2.4 Incidence and persistence of depression from antenatal to postnatal examinations

Of 730 participants assessed at baseline, 238 (33.1%) had total EPDS scores ≥13. Of the 578 participants followed up at 2-6 months post-partum, 151 (26.1%) had EPDS scores above this cut-off. Of those followed successfully, 51 of the 366 without antenatal depression had depression at follow-up, indicating case incidence of 13.9%, and 90 of the 181 cases with antenatal depression continued to have depression at postnatal assessment indicating case persistence of 49.7%. Of the 141 postnatal cases, 90 (63.8%) had previously screened positively for antenatal depression

C.2.5 Associations with incidence and persistence of depression

Unadjusted analyses are summarized for case incidence in Table C.2.1 and case persistence in Table C.2.2. Of the covariates investigated, only lower family income and life events at baseline were significantly associated with case incidence, and only life events were associated with case persistence (Table C.2.2).

Table C.2. 1: Unadjusted associations between participant characteristics and incidence of case level depressive symptoms (non cases at the baseline)

	N	Depression prevalence (%)	Odds ratio (CIs)	χ^2 (df), p-value
Age				0.14 (1) p=0.71
18-22	91	15.4	Reference	
23-25	77	13.0	0.82 (0.34, 1.97)	
26-29	102	9.8	0.60 (0.25, 1.42)	
30-44	84	19.0	1.29 (0.59, 2.85)	
Number of children				1.56 (1) p=0.21
0	182	13.2	Reference	
1	129	10.9	0.80 (0.40, 1.62)	
≥2	52	23.1	1.98 (0.91, 4.29)	
Baby health				0.72 (1)p=0.40
Very good	159	16.4	Reference	
Good	189	11.1	0.64 (0.35, 1.19)	
Average, bad, very bad	15	20.0	1.28 (0.34, 4.85)	
Education level (year)				2.40 (1) p=0.12
≤5	121	17.4	Reference	
6-8	74	14.9	0.83 (0.38, 1.84)	
9-11	118	11.9	0.64 (0.31, 1.33)	
11≥	43	9.3	0.49 (0.16, 1.51)	
Family income (TRY)				7.21 (1) p=0.01*
≤630	83	21.7	Reference	
631-900	91	15.4	0.66 (0.30, 1.42)	

901-1400	121	9.9	0.40 (0.18, 0.88)	
1401- 23000	51	7.8	0.31 (0.09, 0.97)	
Physical health				2.55 (1) p=0.11
Very good	62	8.1	Reference	
Good	245	14.3	1.90 (0.71, 5.07)	
Average/bad/very bad	55	18.2	2.53(0.81, 7.94)	
Number of life events/stressors				5.71 (1) p=0.022*
0	180	10.0	Reference	
1	91	20.9	2.38 (1.17, 4.79)	
2	39	20.5	2.32 (0.93, 5.81)	
3+	18	22.2	2.57 (0.76, 8.65)	
Emotional problems in the past				2.05 (1) p=0.15
No	226	12.4	Reference	
Yes	122	18.0	1.56 (0.85, 2.85)	
Family structure				1.91 (1) p=0.18
Nuclear	245	15.5	Reference	
Traditional	118	10.3	0.62 (0.31, 1.23)	

Table C.2. 2: Unadjusted associations between participant characteristics and persistence of case level depressive symptoms (cases at the baseline)

	n	Depression prevalence (%)	Odds Ratio (CIs)	χ^2 (df), p-value
Age				0.01 (1) p=0.97
18-22	49	51.0	Reference	
23-25	51	54.9	1.17 (0.53, 2.57)	
26-29	32	31.3	0.44 (0.17, 1.11)	
30-44	49	57.1	1.28 (0.58, 2.84)	
Number of children				1.42 (1) p=0.71
0	85	50.6	Reference	
1	58	48.3	0.91 (0.47, 1.79)	
≥2	39	51.3	1.03 (0.48, 2.20)	
Baby health				2.07(1)p=0.15
Very good	73	45.2	Reference	
Good	97	52.6	1.34 (0.73, 2.47)	
Average, bad, very good	11	63.6	2.12 (0.57, 7.88)	
Education level (year)				2.70 (1) p=0.10
≤5	61	41.0	Reference	
6-8	31	54.8	1.75 (0.73, 4.18)	
9-11	65	50.8	1.49 (0.73, 3.01)	
11≥	17	64.7	2.64 (0.86, 8.08)	
Family income (TRY)				1.60 (1) p=0.21
≤630	48	43.8	Reference	

631-900	52	50.0	1.29(0.59, 2.83)	
901-1400	46	45.7	1.08(0.48, 2.44)	
1401- 23000	23	65.2	2.41(0.86, 6.75)	
Physical health				0.11 (1) p=0.74
Very good	30	43.3	Reference	
Good	99	55.6	1.64 (0.72, 3.72)	
Average/bad/very bad	53	43.4	1.00 (0.41, 2.47)	
Number of life events/stressors				4.78 (1) p=0.03*
0	56	41.1	Reference	
1	44	52.3	1.57(0.71, 3.48)	
2	26	42.3	1.05(0.41, 2.70)	
3+	33	60.6	2.21(0.92, 5.31)	
Emotional problems in the past				2.12 (1) p=0.14
No	56	39.3	Reference	
Yes	123	55.3	1.91(1.00, 3.64)	
Family structure				0.02 (1) p=0.88
Nuclear	119	49.6	Reference	
Traditional	63	50.8	1.05 (0.57, 1.94)	

C.2.6 Associations of social support with incidence and persistence of depression

Associations of social support at baseline with case incidence and persistence are summarized in Tables C.2.3 and C.2.4 respectively. In unadjusted models, depression incidence was significantly associated with lower support from the husband and mother-in-law on emotional sub-scales. After full adjustment, lower emotional support from the mother-in-law remained associated with incidence and the association with spouse support was substantially confounded. Regarding persistence of depression, only lower emotional support from the husband was associated, remaining so after full adjustment.

Regarding traditional/nuclear family structure, there was no direct association with either depression incidence or persistence (Tables C.2.5-6) and there were no significant interactions between depression status and family structure in the linear regression models of social support sub-scales.

Table C.2. 3: Adjusted associations between social support and incident depression in non-cases at baseline

Nature of support	Association with case-level depressive symptoms (B-value, 95% CI)			
	Unadjusted	Model 1	Model 2	Model 3
From husband				
Emotional	-2.4 (-3.8, -1.1)*	-2.4 (-3.7, -1.1)*	-1.5 (-2.8, -0.2)*	-1.1 (-2.4, 0.2)
Practical	-0.4 (-1.0, 0.3)	-0.4 (-1.0 0.3)	-0.1 (-0.8, 0.6)	0.1 (-0.6, 0.7)
Negative aspects	0.5 (-0.1, 1.1)	0.5 (-0.1, 1.1)	0.5 (-0.2, 1.1)	0.3 (-0.3, 1.0)
From mother				
Emotional	-1.3 (-3.0, 0.4)	-1.3 (-2.9, 0.4)	-1.0 (-2.7, 0.7)	-0.8 (-2.4, 0.9)
Practical	0.1 (-0.8, 1.0)	-0.2 (-0.7, 1.0)	0.2 (-0.7, 1.1)	0.5 (-0.5, 1.4)
Negative aspects	0.1 (-0.5, 0.7)	0.1 (-0.5, 0.7)	0.2 (-0.5, 0.8)	0.2 (-0.5, 0.9)
From mother in law				
Emotional	-3.4 (-5.4, -1.3)*	-3.4 (-5.3, -1.4)*	-2.6 (-4.6, -0.5)*	-2.8 (-4.9, -0.8)*
Practical	-0.8 (-1.7, 0.2)	-0.8 (-1.7, 0.2)	-0.5 (-1.4, 0.5)	-0.4 (-1.4, 0.6)
Negative aspects	-0.4 (-1.1, 0.3)	-0.4 (-1.1, 0.3)	-0.2 (-1.0, 0.5)	-0.3 (-1.0, 0.5)

Model 1 Adjusted for age.

Model 2 Adjusted for 1 and number of children, duration of education, family income, reported health of the baby, reported physical health, and previous emotional problems

Model 3 Adjusted for 2 and number of life stressors/events

*p<0.05

Table C.2. 4: Adjusted associations between social support and depression persistence in cases at baseline

Nature of support	Association with case-level depressive symptoms (B-value, 95% CI)			
	Unadjusted	Model 1	Model 2	Model 3
From husband				
Emotional	-3.5 (-5.2, -1.6)*	-3.4 (-5.2, -1.7)*	-3.4 (-5.4, -1.4)*	-3.2 (-5.2, -1.3)*
Practical	-0.4 (-1.1, 0.4)	-0.2 (-1.1, 0.4)	-0.2 (-1.0, 0.7)	-0.3 (-1.1, 0.6)
Negative aspects	0.5 (-0.2, 1.1)	0.5 (-0.1, 1.1)	0.5 (-0.2, 1.1)	0.5 (-0.3, 1.2)
From mother				
Emotional	-1.4 (-3.3, 0.6)	-1.5 (-3.4, 0.5)	-1.6 (-3.7, 0.6)	-1.3 (-3.5, 1.0)
Practical	-0.1 (-1.0, 0.8)	-0.1 (-1.0, 0.8)	-0.7 (-1.0, 0.9)	-0.1 (-1.1, 0.9)
Negative aspects	0.1 (-0.5, 0.8)	0.1 (-0.5, 0.8)	0.2 (-0.5, 1.0)	0.4 (-0.4, 1.2)
From mother in law				
Emotional	-1.2 (-3.1, 0.7)	-1.2 (-3.1, 0.7)	-1.0 (-2.9, 1.0)	-0.4 (-2.5, 1.7)
Practical	-0.3 (-1.2, 0.7)	-0.3 (-1.2, 0.6)	-0.3 (-1.3, 0.7)	0.2 (-0.9, 1.2)
Negative aspects	0.8 (-0.1.7)	0.8 (-0.2, 1.7)	0.7 (-0.3, 1.6)	0.7 (-0.3, 1.7)

Model 1 Adjusted for age.

Model 2 Adjusted for 1 and number of children, duration of education, family income, baby health, physical health and previous emotional problems

Model 3 Adjusted for 2 and number of life stressors/events

*$p<0.05$

Table C.2. 5 Effect modification by family structure for the association between incidence of depression and social support at baseline

Dependent variable (social support)	B coefficients (95% CIs) for the interaction between depression and family structure adjusted for all covariates (Model 3 from Table C.2. 3)	
	EPDS variable	Interaction term
From husband		
Emotional	-1.31 (-2.82, 0.20)	1.15 (-1.79, 4.10), p=0.44
Practical	0.02 (-0.74, 0.78)	0.23 (-1.28, 1.73) p=0.77
Negative aspects	0.74 (-0.03, 1.52)	-1.50 (-3.04, 0.04) p=0.06
From mother		
Emotional	-0.91 (-2.85, -1.04)	0.52 (-3.25, 4.29) p=0.79
Practical	0.23 (-0.84, 1.29)	0.73 (-1.34, 2.81) p=0.49
Negative aspects	0.24 (-0.55, 1.04)	-0.20 (-1.75, 1.36) p=0.80
From mother in law		
Emotional	-3.25 (-5.62, -0.18)*	0.39 (-1.73, 2.52) p=0.72
Practical	-0.31 (-1.38, 0.76)	0.47 (-1.89, 2.83) p=0.69
Negative aspects	-0.21 (-1.08, 0.66)	0.18 (-1.55, 1.90) p=0.84

Table C.2. 5 Effect modification by family structure for the association between persistence of depression and social support at baseline

Dependent variable (social support)	B coefficients (95% CIs) for the interaction between depression persistence and family structure adjusted for all covariates (Model 3 from Table C.2. 3)	
	EPDS variable	Interaction term
From husband		
Emotional	-2.77 (-5.16, -0.37)*	-1.11 (-4.95, 2.74) p=0.57
Practical	-0.30 (-1.38, 0.78)	0.18 (-1.57, 1.92) p=0.84
Negative aspects	0.07 (-0.85, 1.00)	1.03 (-0.47, 2.54) p=0.18
From mother		
Emotional	-0.88 (-3.66, 1.91)	-1.12 (-5.64, 3.40) p=0.62
Practical	-0.17 (-1.14, 0.81)	-1.47 (-3.52, 0.58) p=0.16
Negative aspects	0.13 (-0.85, 1.11)	0.74 (-0.88, 2.36) p=0.37
From mother in law		
Emotional	-0.84 (-3.63, 1.95)	1.04 (-3.38, 5.46) p=0.64
Practical	0.03 (-1.27, 1.34)	0.30 (-1.81, 2.40) p=0.78
Negative aspects	1.10 (-0.21, 2.41)	-1.07 (-3.18, 1.05) p=0.32

CHAPTER C.3 Associations between perinatal depression and subsequent changes in social support

C.3.1 Objectives

These analyses sought to describe changes in social support in the sample across all four examinations and to address study hypothesis 4 through comparing changes in social support measures between mothers with and without baseline (antenatal) depression.

C.3.2 Statistical analyses

Changes in social support measures were initially displayed by cross-tabulating mean scores by examination point in participants with and without case level depression at baseline. Mixed models were then applied to these changes and were constructed as follows: the score for the individual social support measure was entered as the dependent variable with the examination point, baseline case-level depression (binary variable) and an interaction term between the two as the principal independent variables. Following consultation around the analysis procedures, examination number (i.e. 1, 2, 3 or 4) was chosen as an ordinal variable to define 'time', accepting the limitation that intervals between examinations were not even. Of the coefficients generated, that for case-level depression represented the difference in intercept between the two groups (i.e. the association between depression and social support at baseline), that for time represented the overall change in the social support measure for participants without baseline depression, and that for the interaction term represented the difference in this slope for participants with baseline depression. Potential confounding factors were added in blocks with the following models: Model 1 adjusted for age; Model 2 adjusted for age plus education, number of children, family structure,

physical health, past emotional problems; Model 3 adjusted for all above variables plus adverse life events at baseline.

C.3.3 Associations between antenatal depression and trajectories of social support across the follow-up period

Table C.3.1.summarises mean scores for the social support measures by exposure group and examination. Table C.3.2 displays output from the mixed models considering the unadjusted and adjusted trends in social support measures and differences between participants with/without baseline (antenatal) depression. The coefficients for depression, representing differences in intercept (i.e. in social support at time zero) unsurprisingly yield similar results to the cross-sectional associations between antenatal social support and depression described in C.1. Time terms for emotional and practical support were negative indicating decreasing scores over the examinations in participants without case-level depression – significant for all three relationships in all models apart from practical support from the mother. From visual inspection of Table C.3.1, there was no consistent pattern across these measures regarding the timing of the deterioration (e.g. not solely occurring between the first and second examination). Time terms for negative aspects of the relationship were not significant for any relationship indicating no change across the examinations. Interaction terms between depression and time were significant in adjusted models for emotional support from the husband and for emotional and practical support from the mother-in-law – the positive value of these coefficients, coupled with the negative time terms indicated a more rapid deterioration in these measures of social support in women who reported depression at baseline.

.

In fully adjusted models, considering interaction terms as the key output of interest, coefficients in Models 1 and 2 remained similar to those in unadjusted models. Adjustment for life events prior to the baseline assessment had more of an impact on coefficients, weakening those for the spouse relationship and strengthening those for the relationship with the mother-in-law.

The fully adjusted associations between baseline depression and trajectories of social support are further compared between nuclear and traditional family structures in Table C.3.3. From visual inspection, time coefficients were generally similar between the two strata, therefore not indicating that deterioration was more or less marked in one structure compared to the other. In terms of the interactions between depression and time, the coefficients for emotional and practical support from the husband appeared substantially stronger in the traditional compared to the nuclear family structure but those for the mother-in-law relationship showed less evidence of variation.

Table C.3.1 Social support scores by examination and baseline depression status

Social support measure	Mean social support scores							
	No depression at baseline (n=492)				Depression at baseline (n=238)			
	Exam 1	Exam 2	Exam 3	Exam 4	Exam 1	Exam 2	Exam 3	Exam 4
From husband								
Emotional	27.4	26.6	26.6	26.3	23.4	23.4	23.3	23.9
Practical	10.0	9.8	9.5	9.2	8.9	9.3	8.6	8.1
Negative aspects	10.2	9.4	10.3	10.3	11.8	10.7	11.3	11.4
From mother								
Emotional	25.1	23.9	22.5	24.1	23.2	22.8	21.3	23.6
Practical	8.5	8.5	7.6	7.7	8.4	8.4	7.0	8.1
Negative aspects	9.3	8.7	9.1	9.0	10.0	8.9	9.3	9.6
From mother in law								
Emotional	19.9	19.2	17.6	18.3	16.0	17.2	15.7	17.2

Practical	7.3	7.6	6.1	6.3	6.0	7.3	5.8	6.4
Negative aspects	9.5	8.4	8.9	9.6	10.3	9.4	10.2	10.1

Table C.3.2 The adjusted associations between baseline depression and third follow up social support. B-coefficients and 95% confidence intervals are displayed.

Nature of support	Unadjusted	Model 1	Model 2	Model 3
From husband				
Emotional support				
Depression B (CIs)	-4.43 (-5.45, -3.31)*	-4.40 (-5.42, -3.38)*	-3.84 (-4.92, -2.77)*	-3.20 (-4.32, -2.08)*
Time B (CIs)	-0.29 (-0.50, -0.08)*	-0.28 (-0.49, -0.06)*	-0.32 (-0.54, -0.10)*	-0.32 (-0.55, -0.10)*
Interaction B (CIs)	0.52 (0.15, 0.89)*	0.51 (0.14, 0.89)*	0.54 (0.15, 0.93)*	0.42 (0.01, 0.84)*
Practical support				
Depression B (CIs)	-1.23 (-1.66, -0.79)*	-1.22 (-1.66, -0.78)*	-1.04 (-1.50, -0.58)*	-0.81 (-1.31, -0.31)*
Time B (CIs)	-0.23 (-0.32, -0.13)*	-0.21 (-0.31, -0.12)*	-0.21 (-0.31, -0.11)*	-0.21 (-0.31, -0.11)*
Interaction B (CIs)	0.23 (0.06, 0.39)*	0.22 (0.05, 0.38)*	0.20 (0.03, 0.37)*	0.17 (-0.02, 0.36)
Negative aspects of the relationship				
Depression B (CIs)	1.73 (1.24, 2.22)*	1.71 (1.22, 2.21)*	1.45 (0.92, 1.97)*	1.25 (0.68, 1.81)*
Time B (CIs)	0.08 (-0.03, 0.18)	0.06 (-0.04, 0.17)	0.07 (-0.04, 0.18)	0.04 (-0.07, 0.16)

Interaction B (CIs)	-0.20 (-0.39, -0.02)*	-0.18 (-0.37, -0.01)*	-0.20 (-0.39, -0.01)*	-0.18 (-0.39, 0.03)
From mother				
Emotional support				
Depression B (CIs)	-2.07 (-3.26, -0.88)*	-1.99 (-3.18, -0.80)*	-1.69 (-2.93, -0.45)*	-1.30 (-2.60, -0.01)*
Time B (CIs)	-0.40 (-0.65, -0.14)*	-0.41 (-0.67, -0.15)*	-0.41 (-0.68, -0.15)*	-0.41 (-0.69, -0.14)*
Interaction B (CIs)	0.41 (-0.05, 0.86)	0.41 (-0.05, 0.87)	0.51 (0.04, 0.98)*	0.49 (-0.01, 0.99)
Practical support				
Depression B (CIs)	-0.20 (-0.79, 0.39)	-0.17 (-0.77, 0.41)	-0.15 (-0.47, 0.76)	0.14 (-0.51, 0.79)
Time B (CIs)	-0.29 (-0.41, -0.17)*	-0.28 (-0.40, -0.16)*	-0.26 (-0.38, -0.13)*	-0.24 (-0.37, -0.11)*
Interaction B (CIs)	0.08 (-0.13, 0.29)	0.07 (-0.14, 0.29)	0.02 (-0.20, 0.24)	0.04 (-0.20, 0.28)
Negative aspects of the relationship				
Depression B (CIs)	0.61 (0.12, 1.10)*	0.57 (0.07, 1.07)*	0.51 (0.01, 1.03)	0.46 (-0.10, 1.02)
Time B (CIs)	-0.06 (-0.17, 0.04)	-0.07 (-0.18, 0.04)	-0.06 (-0.17, 0.05)	-0.07 (-0.19, 0.04)
Interaction B (CIs)	-0.07 (-0.25, 0.12)	-0.05 (-0.23, 0.14)	-0.07 (-0.27, 0.12)	-0.09 (-0.30, 0.12)

From mother in law				
Emotional support				
Depression B (CIs)	-4.20 (-5.47, -2.93)*	-4.19 (-5.45, -2.93)*	-3.74 (-5.05, -2.43)*	-3.66 (-5.03, -2.29)*
Time B (CIs)	-0.57 (-0.81, -0.33)*	-0.55 (-0.79, -0.31)*	-0.58 (-0.83, -0.34)*	-0.57 (-0.82, -0.33)*
Interaction B (CIs)	0.76 (0.35, 1.18)*	0.77 (0.35, 1.19)*	0.84 (0.41, 1.28)*	1.03 (0.58, 1.47)*
Practical support				
Depression B (CIs)	-1.47 (-2.06, -0.87)*	-1.47 (-2.06, -0.88)*	-1.29 (-1.90, -0.68)*	-1.17 (-1.81, -0.54)*
Time B (CIs)	-0.39 (-0.50, -0.28)*	-0.38 (-0.49, -0.26)*	-0.36 (-0.47, -0.24)*	-0.33 (-0.45, -0.21)*
Interaction B (CIs)	0.39 (0.19, 0.58)*	0.39 (0.19, 0.59)*	0.40 (0.19, 0.60)*	0.45 (0.24, 0.67)*
Negative aspects of the relationship				
Depression B (CIs)	0.92 (0.32, 1.52)*	0.90 (0.30, 1.51)*	0.76 (0.12, 1.40)*	0.71 (0.02, 1.40)*
Time B (CIs)	0.04 (-0.09, 0.17)	0.04 (-0.09, 0.18)	0.07 (-0.06, 0.21)	0.06 (-0.08, 0.21)
Interaction B (CIs)	-0.04 (-0.27, 0.18)	-0.04 (-0.26, 0.19)	-0.05 (-0.28, 0.19)	-0.07 (-0.32, 0.19)

Model 1: adjusted for age; Model 2: Model 1 plus education, number of children, family structure, physical health, past emotional problems; Model 3: Model 2 plus life events; *p<0.05

Table C.3.3 The adjusted associations between baseline depression and third follow up social support in nuclear and traditional family settings. B-coefficients and 95% confidence intervals are displayed.

	Fully adjusted coefficients (Model 3 from Table C.3.2)		
Nature of support	Full sample	Nuclear family	Traditional family
From husband			
Emotional support			
Depression B (CIs)	-3.20 (-4.32, -2.08)*	-2.05 (-3.49, -0.61)*	-5.38 (-7.16, -3.60)*
Time B (CIs)	-0.32 (-0.55, -0.10)*	-0.15 (-0.43, -0.61)*	-0.70 (-1.07, -0.34)*
Interaction B (CIs)	0.42 (0.01, 0.84)*	0.09 (-0.44, 0.62)	1.08 (0.43, 1.74)*
Practical support			
Depression B (CIs)	-0.81 (-1.31, -0.31)*	-0.49 (-1.12, 0.15)	-1.42 (-2.22, -0.62)*
Time B (CIs)	-0.21 (-0.31, -0.11)*	-0.21 (-0.33, -0.08)*	-0.24 (-0.42, -0.66)*
Interaction B (CIs)	0.17 (-0.02, 0.36)	0.05 (-0.19, 0.28)	0.42 (0.11, 0.74)*
Negative aspects of the relationship			

Depression B (CIs)	1.25 (0.68, 1.81)*	1.26 (0.55, 1.98)*	1.42 (0.48, 2.36)*
Time B (CIs)	0.04 (-0.07, 0.16)	0.07 (-0.07, 0.21)	-0.01 (-0.21, 0.19)
Interaction B (CIs)	-0.18 (-0.39, 0.03)	-0.18 (-0.43, 0.08)	-0.20 (-0.55, 0.15)
From mother			
Emotional support			
Depression B (CIs)	-1.30 (-2.60, -0.01)*	-0.63 (-2.26, 0.99)	-2.01 (-4.22, 0.21)
Time B (CIs)	-0.41 (-0.69, -0.14)*	-0.35 (-0.70, 0.01)	-0.55 (-1.00, -0.11)*
Interaction B (CIs)	0.49 (-0.01, 0.99)	0.46 (-0.18, 1.09)	0.56 (-0.24, 1.36)
Practical support			
Depression B (CIs)	0.14 (-0.51, 0.79)	0.14 (-0.68, 0.96)	0.38 (-0.73, 1.48)
Time B (CIs)	-0.24 (-0.37, -0.11)*	-0.21 (-0.38, -0.05)*	-0.31 (-0.52, -0.10)*
Interaction B (CIs)	0.04 (-0.20, 0.28)	0.04 (-0.26, 0.35)	0.07 (-0.31, 0.45)
Negative aspects of the relationship			
Depression B (CIs)	0.46 (-0.10, 1.02)	0.35 (-0.35, 1.05)	0.79 (-0.17, 1.74)

Time B (CIs)	-0.07 (-0.19, 0.04)	-0.06 (-0.20, 0.08)	-0.11 (-0.31, 0.09)
Interaction B (CIs)	-0.09 (-0.30, 0.12)	0.01 (-0.25, 0.26)	-0.23 (-0.59, 0.12)
From mother in law			
Emotional support			
Depression B (CIs)	-3.66 (-5.03, -2.29)*	-3.09 (-4.80, -1.37)*	-4.82 (-7.22, -2.43)*
Time B (CIs)	-0.57 (-0.82, -0.33)*	-0.65 (-0.95, 0.36)*	-0.43 (-0.89, 0.04)
Interaction B (CIs)	1.03 (0.58, 1.47)*	1.05 (0.51, 1.58)*	0.94 (0.12, 1.76)*
Practical support			
Depression B (CIs)	-1.17 (-1.81, -0.54)*	-1.04 (-1.83, -0.23)*	-1.73 (-2.81, -0.66)*
Time B (CIs)	-0.33 (-0.45, -0.21)*	-0.29 (-0.44, -0.14)*	-0.42 (-0.63, -0.21)*
Interaction B (CIs)	0.45 (0.24, 0.67)*	0.41 (0.14, 0.68)*	0.54 (0.16, 0.91)*
Negative aspects of the relationship			
Depression B (CIs)	0.71 (0.02, 1.40)*	0.56 (-0.33, 1.45)	1.00 (-0.12, 2.11)
Time B (CIs)	0.06 (-0.08, 0.21)	0.10 (-0.08, 0.28)	0.01 (-0.22, 0.25)

Interaction B (CIs)	-0.07 (-0.32, 0.19)	-0.02 (-0.34, 0.30)	-0.14 (-0.55, 0.28)

CHAPTER C.4 Associations between perinatal depression and child development

C.4.1 Objectives

These analyses sought to investigate the relationship between child development at the final examination and previous depression caseness in the mother, addressing Hypothesis 5. Secondary objectives were to investigate wider factors, including social support as a predictor of development, and other health-relevant outcomes in relation to previous depression.

C.4.2 Statistical analysis

Child development continues scores on the GMCD were the primary outcomes, and in order to make use of the continuously distributed data, GMCD subscales were treated as dependent variables using t-tests initially to investigate significance and then linear regression models to adjust for covariates. Caseness on the EPDS at previous examinations was the primary independent variable. Child age and gender, and mother's education were covariates in the model. The sample size was felt to be sufficient to justify this approach of linear modelling, despite non-normal GMCD subscale distributions.

C.4.3 Sample characteristics

Of 446 mothers participating in the fourth examination, sufficient data for the analyses were present for the children of 379 (85%), having excluded pre-term births. The mean age of mothers in this sample was 27.6 years (SD 5.2, range 19-46) and the mean duration of education 8.4 years (SD 4.5). Almost all (99.5 %) were married and all of these bar two lived with their husband. Most (91%) reported a 'good' or 'very good'

relationship with their husband, and 68% reported that the husband helped take care of the baby. The majority (84%) were living in nuclear family structures. Most (90%) reported 'good' or 'very good' physical health, 23% were current smokers, none reported alcohol consumption, and 54% reported no recent life events. The mean EPDS score was 8.35 (SD 6.2, range 0-29) and 20.9% were depressed according to EPDS cut-off point 13.

The index child's mean age was 20.9 months (SD 2.4, range 16-36), 50.1% were male and 41% were first births. Most (90%) were reported to be in 'good' or 'very good' health. In terms of the index pregnancy, 77% were reported to be planned. Almost all of the participants (99%) had given birth at health facilities and 63% had a natural delivery. At least one episode of diarrhoea was reported for 35%, and 14% had been previously hospitalized, almost all (99%) just once. Of the mothers, 24% admitted to worries at some point since the birth that the baby would die, and most (91%) had breastfed with a mean duration of 5.6 months (SD 2.3, range 0- 22, 37% currently breastfeeding). All except one had started solid foods, 20% reported feeding problems in the index child, 8% had had another baby since the index child and 6% were currently pregnant.

C.4.4 Associations between socio demographic factors and child development

Associations between socio demographic factors and child development are summarized in Table C.4.1. Development subscale scores were all significantly higher in older children and the total score was significantly higher in women with higher education. However, there were no significant associations with mother's age, child's gender or family structure.

Table C.4.1 The associations between child development and socio-demographic factors

Characteristic	Linear regression coefficient (p-value) for association with child development (GMCD) subscale						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social and emotional, cognitive)	Self-help skills	Total score
Child's age (months)	1.03 (<0.01)*	1.56 (<0.01)*	0.67 (<0.01)*	0.16 (<0.01)*	0.18 (<0.01)*	0.14 (<0.01)*	3.9 (<0.01)*
Mother's age (years)	-0.49 (p=0.06)	-0.62 (0.11)	-0.39 (0.09)	-0.06 (0.55)	-0.08 (0.48)	0.03 (0.66)	-1.36 (0.17)
Mother's education (years)	0.38 (0.15)	0.57 (0.15)	0.33 (0.14)	0.09 (0.35)	0.06 (0.61)	0.11 (0.11)	1.94 (0.05)*
Child's gender	-0.29 (0.29)	-0.49 (0.23)	-0.16 (0.48	-0.16 (0.08)	-0.14 (0.20)	0.03 (0.59)	-1.02 (0.31)
Family	0.29 (0.28)	0.39 (0.33)	0.15 (0.50)	0.05 (0.58)	0.06 (0.58)	-0.03 (0.62)	0.73 (0.48)

C.4.5 Associations between social support and child development

Associations between social support and child development are displayed in Table C.4.2. Higher emotional support from the mother-in-law was associated with higher scores on the total GMCD scale and two sub-scales, but there were no significant associations with any other factor.

Table C.4. 2. Associations between social support and child development

Social support measure	Linear regression coefficient (p-value) for association with child development (GMCD) subscale						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social and emotional, cognitive)	Self-help skills	Total score
From husband							
Emotional	-0.15 (0.56)	-0.24 (0.54)	-0.37 (0.10)	-0.15 (0.11)	-0.15 (0.18)	-0.05 (0.50)	-0.72 (0.48)
Practical	-0.24 (0.35)	-0.35 (0.36)	-0.25 (0.25)	-0.03 (0.73)	-0.09 (0.43)	0.01 (0.86)	-0.75 (0.45)
Negative aspects	0.01 (0.96)	-0.01(0.97)	0.08 (0.72)	0.04 (0.65)	0.10 (0.38)	-0.01 (0.95)	-0.02 (0.99)
From mother							
Emotional	0.22 (0.43)	0.33 (0.43)	-0.07 (0.76)	-0.06 (0.53)	-0.06 (0.61)	0.08 (0.23)	0.95 (0.38)
Practical	0.00 (1.00)	-0.01 (0.98)	-0.20 (0.39)	-0.05 (0.63)	-0.08 (0.49)	0.10 (0.13)	0.15 (0.88)
Negative aspects	-0.51 (0.05)	-0.77 (0.05)	-0.32 (0.14)	-0.15 (0.09)	-0.04 (0.73)	0.01 (0.98)	-2.01 (0.04)
From mother in law							

Emotional	0.65 (0.01)*	0.90 (0.02)*	0.20 (0.37)	0.12 (0.19)	-0.10 (0.36)	0.01 (0.89)	2.15 (0.03)*
Practical	0.29 (0.26)	0.30 (0.43)	-0.08 (0.72)	-0.03 (0.75)	-0.16 (0.13)	-0.04 (0.52)	0.64 (0.51)
Negative aspects	0.79 (0.40)	0.98 (0.49)	-0.16 (0.84)	0.20 (0.54)	0.14 (0.72)	-0.38 (0.11)	1.49 (0.67)

C.4.6 Associations between antenatal and postnatal depression and child development

Associations between perinatal depression and child development are summarized in Table C.4.3 (unadjusted) and Table C.4.4 (adjusted for child's age in months and mother's education). In both models, the only significant association was a contemporaneous one between maternal depression and lower self help skills of the child; further adjustment for the gender of child did not alter these associations.

Table C. 4. 3 Unadjusted associations between antenatal and postnatal depression and child development

Timing of depression assessment	Linear regression coefficient (p-value) for the association between depression (independent variable) and child development (GMCD) subscale (dependent variable)						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social, emotional, cognitive)	Self-help skills	Total score
Exam 1	-0.44 (0.12)	-0.66 (0.12)	-0.17 (0.47)	-0.01 (0.9)	0.04 (0.76)	-0.13 (0.06)	-1.87 (0.08)
Exam 2	0.16 (0.61)	0.28 (0.54)	0.48 (0.06)	0.17 (0.1)	0.23 (0.08)	0.07 (0.37)	1.18 (0.30)
Exam 3	0.20 (0.20)	0.27 (0.58)	0.33 (0.21)	0.09 (0.40)	0.15 (0.27)	0.04 (0.65)	0.81 (0.50)
Exam 4	-0.20 (0.53)	-0.48 (0.32)	-0.21 (0.45)	-0.17 (0.13)	-0.22 (0.11)	-0.21 (0.01)*	-0.98 (0.43)

Table C. 4. 4. Associations between and antenatal and postnatal depression and child development, adjusted for child's age and mother's education

Timing of depression assessment	Linear regression coefficient (p-value) for the association between depression (independent variable) and child development (GMCD) subscale (dependent variable)						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social and emotional, cognitive)	Self-help skills	Total score
Exam 1	-0.51 (0.07)	-.0.74 (0.08)	-0.21 (0.39)	-0.03 (0.79)	-0.04 (0.73)	-0.11 (0.11)	-2.-3 (0.05)
Exam 2	0.02 (0.77)	0.07 (0.88)	0.39 (0.14)	0.15 (0.16)	0.20 (0.12)	0.06 (0.42)	0.67 (0.56)
Exam 3	0.07 (0.83)	0.06 (0.90)	0.24 (0.37)	0.07 (0.54)	0.12 (0.39)	0.04 (0.63)	0.31 (0.80)
Exam 4	-0.33 (0.31)	-0.65 (0.18)	-0.27 (0.33)	-0.20 (0.07)	-0.26 (0.06)	-0.19 (0.02)*	-1.29 (0.30)

Unadjusted associations are displayed in Table C.4.5 between child development and the number of examinations at which depression was ascertained, with further analyses displayed in Table C.4.6 adjusted for child's age in month and mother's education. Neither model indicated any evidence for a consistent association across the exposure groups, and further adjustment for the gender of the child did not alter the findings.

.

Table C.4.5 Unadjusted associations between the number of times depression was ascertained and child development

Number of examinations at which depression was present	Linear regression coefficient (p-value) for the association with child development (GMCD) subscale						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social and emotional, cognitive)	Self-help skills	Total score
0 (n=136)	Reference	Reference	Reference	Reference	Reference	Reference	Reference
1 (n=64)	-0.81 (0.03)*	-1.11 (0.04)*	-0.34 (0.26)	-0.15 (0.23)	-0.22 (0.16)	-0.01 (0.91)	-1.69 (0.21)
2 (n=48)	-0.05 (0.91)	-0.10 (0.88)	-0.00 (0.99)	-0.09 (0.55)	-0.15 (0.39)	-0.05 (0.62)	-0.24 (0.88)
3 (n=34)	-0.44 (0.36)	-0.72 (0.31)	0.07 (0.87)	0.05 (0.78)	0.14 (0.49)	-0.08 (0.50)	-0.84 (0.64)
4 (n=18)	0.19 (0.75)	0.41 (0.65)	0.68 (0.18)	0.15 (0.48)	0.16 (0.53)	-0.03 (0.81)	1.40 (0.54)
Ordinal variable	-0.02 (0.83)	-0.04 (0.79)	0.09 (0.34)	0.02 (0.69)	0.03 (0.59)	-0.02 (0.50)	0.04 (0.93)

Table C.4.6. Associations between the number of times depression was ascertained and child development, adjusted for child age and mother's education

Number of examinations at which depression was present	Linear regression coefficient (p-value) for the association with child development (GMCD) subscale						
	Expressive language and communication	Receptive language	Fine and gross motor	Relationship	Play (social and emotional, cognitive)	Self-help skills	Total score
0 (n=136)	Reference	Reference	Reference	Reference	Reference	Reference	Reference
1 (n=64)	-0.89 (0.02)*	-1.24 (0.02)*	-0.41 (0.19)	-0.17 (0.17)	-0.23 (0.15)	-0.03 (0.71)	-1.91 (0.16)
2 (n=48)	-0.04 (0.93)	-0.21 (0.74)	-0.02 (0.97)	-0.09 (0.56)	-0.19 (0.30)	-0.04 (0.68)	-0.31 (0.85)
3 (n=34)	-0.54 (0.27)	-0.86 (0.23)	0.05 (0.91)	0.09 (0.59)	0.17 (0.41)	-0.10 (0.40)	-1.29 (0.47)
4 (n=18)	-0.09 (0.88)	-0.02 (0.98)	0.48 (0.38)	0.08 (0.74)	0.014 (0.89)	-0.05 (0.77)	-0.15 (0.95)
Ordinal variable	-0.08 (0.50)	-0.13 (0.45)	0.06 (0.56)	0.01 (0.77)	0.01 (0.83)	-0.02 (0.41)	-0.18 (0.67)

C.4.7 Secondary analyses of other child outcomes

Associations between antenatal depression and low birth weight, preterm birth, diarrhoea, breastfeeding and taking baby to the hospital are summarized in Table C.4.5. No associations were found with low birth weight or preterm birth and associations were not significant for most outcomes apart from with a reduced likelihood of the mother's commencement of breast feeding at the first follow-up and a reduced likelihood of infant hospitalization at the third (but not other) examinations, both of which were at borderline levels of statistical significance.

Table C.4.7 Associations between antenatal depression and secondary child outcomes

Child outcome	Association with antenatal (Exam 1) depression (odds ratio, 95% CI)
Low birth weight (< 2500g)	0.94 (0.67, 1.32)
Preterm baby (<36 weeks)	0.81 (0.55, 1.19)
Exam 2 outcomes	
Starting breastfeeding	0.44 (0.19, 1.02)*
Stopping breastfeeding	0.91 (0.53, 1.55)
Diarrhoea since birth	1.32 (0.88, 1.98)
Infant hospitalization since birth	1.35 (0.91, 2.00)
Exam 3 outcomes	
Diarrhoea since birth	1.32 (0.88, 1.98)
Infant hospitalization since birth	0.55 (0.33, 0.94)*
Exam 4 outcomes	
Diarrhoea since birth	1.27 (0.81, 1.98)
Infant hospitalization since birth	0.98 (0.52, 1.86)

CHAPTER D DISCUSSION

D.1 Summary of the results

In this prospective study of perinatal depression in traditional and nuclear family settings in and around Ankara, of 730 participants assessed at baseline, 238 (32.6%) had case level depression at baseline as defined by a total EPDS score ≥13. In cross-sectional analyses at the antenatal examination, depression was associated with worse self-rated social support from the husband on all three domains examined (emotional support, practical support and negative aspects), with lower practical and emotional support from the mother-in-law and with higher negative aspects of the relationship with the mother. Most associations between depression and social support were not modified by family structure, although the association with lower emotional support from the husband was stronger in traditional compared to nuclear families.

Of the 578 participants followed up at 2-6 months post-partum, 151 (26.1%) had depression with case incidence and persistence 13.9% and 49.7% respectively. Of social support measures, lower emotional support from the mother-in-law at baseline remained associated with incidence of depression after full adjustment; lower emotional support from the husband was associated with depression incidence in most models but was partly confounded by other covariates. Lower emotional support from the husband was associated with persistence of depression, remaining significant after full adjustment. Regarding traditional/nuclear family structure, there was no direct association with either depression incidence or persistence and there was no evidence for effect-modification of the associations of interest.

Extending the analyses over all four examinations from the third trimester to 18 months *post partum*, trajectories of change in social support measures were investigated and compared between participants with and without antenatal depression. Repeated measures analyses indicated a general picture of declining self-reported relationship quality over time, most evident for relationships with the spouse and the mother-in-law. For these two, there was evidence that the decline was more marked in participants with antenatal depression than in those without. This accelerated decline in emotional and practical support from the spouse associated with depression was stronger in traditional compared to nuclear family settings, whereas that for the mother-in-law relationship appeared similar between traditional and nuclear settings.

Associations with child development at the final 18-month examination were investigated. Associations in the predicted directions were found with the child's age and the mother's education but no associations were found with maternal age or family structure. No consistent evidence was found for depression as a predictor of child development or any secondary health outcomes.

Considering the study hypotheses, the conclusions are as follows:

Hypothesis 1: Antenatal depression will be associated independently with reduced reported social support (emotional support, practical support and negative aspects) from the husband, mother and mother-in-law.

Depression was significantly associated with all three measures of social support from the husband, with lower practical and emotional support from the mother-in-law and

with higher negative aspects of the relationship with the mother. This hypothesis was therefore in general supported.

Hypothesis 2: Lower reported social support (emotional support, practical support and negative aspects) from the husband, mother and mother-in-law scores in the antenatal period will also be associated with incidence and maintenance of case-level depressive symptoms at 2-6 months post partum.

This hypothesis was only partly supported for certain aspects of social support from certain relatives (lower emotional support from the mother-in-law in relation to depression incidence; lower emotional support from the husband in relation to depression maintenance).

Hypothesis 3: The strength of association between antenatal social support and ante- and postnatal depression will be stronger in nuclear family settings than the traditional family settings.

This hypothesis was not supported. Most interaction tests with family setting were non-significant for both antenatal depression and changes in depression status in the first postnatal examination. The only significant term indicated a stronger association with social support (lower emotional support from the husband in relation to antenatal depression) in traditional compared to nuclear settings. Analyses for Hypothesis 4 (below) suggested that this was more likely to be explained by an influence of depression on quality of the spouse relationship than by the spouse relationship as a risk factor for depression.

Hypothesis 4: Antenatal (baseline) depression will predict a deterioration in social support over the perinatal period.

This hypothesis was supported with respect to emotional support from the husband and emotional and practical support from the mother-in-law both of which declined across examinations in the sample as a whole and declined significantly more sharply in participants with antenatal depression.

Hypothesis 5: Antenatal and postnatal depression will be associated with more delayed child development at 18 months.

This hypothesis was not supported. No consistent associations were found between child development measures and previous depression status, either individually or cumulatively.

D.2 Methodological considerations

Chance

Key issues to consider here are the risk of type 1 and 2 statistical error, the first resulting in 'false positive' findings (inappropriate rejection of the null hypothesis) and the second resulting in 'false negative' findings (inappropriate acceptance of the null hypothesis). The principal factor increasing risk of type 1 error is the number of analyses carried out. Considering this, it is important to bear in mind that the study used only one measure of depression but analysed this against nine primary social support measures, all given equal weight. As is conventional now in epidemiological research, no adjustments were made for the number of analyses (e.g. Bonferonni procedures). Instead, the results were presented as derived and inferences are drawn concerning the consistency of findings rather than the significance of individual associations. For example: associations between depression and the self-reported relationship with the mother were generally less evident than those with the husband or mother-in-law despite some individually significant analyses; similarly evidence for differences in associations of interest between traditional and nuclear families was concluded largely to be absent, and the individual significant interaction term concerning the emotional relationship with the husband and antenatal depression should be viewed with caution, despite its potential plausibility.

Concerning type 2 statistical error, the power of the study in terms of its sample size was high for most hypotheses with a relatively low risk of false negative findings. In particular, upper confidence intervals for most coefficients do not suggest that important

associations were being missed. The possible exception to this is the effect modification with family structure since the study was not powered originally to detect interaction terms, particularly in the second set of analyses described in C.2 which had further stratified the sample by baseline depression status in order to measure incidence and maintenance.

Bias

Considering the sample and selection bias, very high participation rates (97.3%) were present at baseline and missing data were minimal, suggesting a low likelihood of bias for the cross-sectional analyses reported in C.1. Loss to follow-up is a more important consideration. Most of this occurred between the antenatal and first postnatal examination for reasons outside the control of the researchers (a substantial social relocation of residents in one of the study areas and difficulties encountered in tracing this group). Individual follow-up rates were reasonable compared to other cohorts – 79.2% from baseline to first follow-up, 84.4% between the first and second follow-up, 91.8% between the second and third follow-up. However, it should be borne in mind that the analyses reported across all four follow-ups were on participants that constituted 61.4% of the original baseline sample.

Information bias is a further important consideration. The key measurements of depression, social support and child development are discussed in more detail below. However, consistent with other large-scale studies, most of the data was derived from maternal report with an inevitable potential for reporting bias: for example, depressed women perceiving less social support or depressed mothers not recognising their children's abilities. Cross-sectional associations between depression and social support

(C.1) or those between contemporaneous depression and child development (C.4) therefore need to be viewed with caution. However, this was less of an issue for the prospective analyses which form the principal components of this thesis.

A further consideration is measurement error or 'non-differential' information bias. The effect of this is to bias findings towards the null and therefore should be considered particularly in relation to negative findings. One unsupported hypothesis concerned differences in strengths of association between traditional and nuclear family structures. Failure to identify consistent differences may reflect lack of statistical power, as has been described earlier. However, it could also have been caused by measurement error in the extent to which traditional and nuclear family settings were distinguished and represented different environments. While the candidate does believe that there was sufficient heterogeneity in the family backgrounds sampled in this area, it is possible that power to detect differences might have been enhanced if the study had been carried out over a wider catchment and had included more rural communities.

A second unsupported hypothesis concerned the association between child health/development and previous depression. The rationale for using the Guide for Monitoring Child Development (GMCD) has been described earlier, will be considered further below, and its validity in the study reported here is supported by the fact that it showed associations with some covariates (child age and to a lesser extent maternal education). However, it remains possible that associations of depression would have been detectable with more subtle differences in development identifiable with a longer more intensive investigation, or in a study where development had been tracked over a longer period.

Confounding

A range of potential confounding factors were controlled for during the process of the analyses. Nevertheless, there remains a possibility of residual confounding of some unmeasured variables, in particular mother's personality, paternal depression, and mother-child interaction. These have been shown to be related to both maternal depression and lead to poor cognitive development in children (Ramchandani et al 2005, Deave et al 2008). In addition, it should be borne in mind that measurement error in the covariates that were considered would have also led to under-estimated confounding effects.

A related issue concerns the measurement properties of the social support scales themselves. Although conventionally termed 'emotional support', 'practical support', and 'negative aspects of the close relationship', dimensions of relationship quality are clearly highly related constructs and it is possible that another unmeasured element of social support or relationship would have been a more salient exposure and the principal reason underlying the observed associations.

Direction of causation and further considerations

Cross-sectional analyses (e.g. those reported in C.1) limit inferences because it is not possible to infer the direction of causation between exposure (social support) and outcome (depression). One reason for the prospective analyses reported in C.2 and C.3 was to help clarify the matter and this issue will be discussed later. A second limitation of cross-sectional research is that prevalence of the outcome (depression) is determined both by incidence and case duration (i.e. speed of recovery). Factors associated with

depression may therefore be those which increase the risk of depression incidence or delay the likelihood of depression recovery, or both. A second underlying reason for the analyses described in C.2 was to clarify this issue and to distinguish factors influencing incidence and maintenance.

Validity and generalisability: consideration of the sample

The high response rate at baseline and the use of a wide range of clinical services as a sampling frame increases the likely generalisability of the findings to the source population. It is important to bear in mind that random sampling of clinical services was not feasible so that the sample cannot be assumed to be wholly representative, although the candidate is not aware of any features of the sampling frame that would limit this substantially. As stated earlier, the range of family structures was believed to be wide enough to test the hypothesis of interest, although it is possible that results might have been different in other settings outside Ankara. Finally, contrasts between traditional and nuclear family structures may have limited generalisability as these have co-existed in Turkey for much longer than many other countries.

.

Validity and generalisability: consideration of measurements used

The key three features measured and analyzed in the sample were depression, social support and child development. The rationale behind the choice of measurements has been described earlier; however, key considerations are outlined here.

Edinburgh Postnatal Depression Scale (EPDS)

As described in sections A.8.1 and B.2.4, the EPDS was chosen for this study as the principal measure of depression because of its widespread use in international research

of this nature and in Turkey in particular. The EPDS is a self rating scale and was designed to be a screening tool rather than a diagnostic instrument. In this study, depression was defined according to a cut off point of ≥ 13. Gaynes et al. (2005) when reviewing scales used in perinatal depression assessment suggested that a positive screen on the EPDS or Beck Depression Inventory was as accurate as a full diagnostic schedule; however, recorded sensitivities varied considerably, the EPDS and PDSS appearing to be more sensitive than the BDI instruments. In that review, for major depression, sensitivities for the Edinburgh Postnatal Depression Scale were 1.0, specificities ranged from 0.79 (at EPDS >12) to 0.96 (at EPDS >15). For major or minor depression, sensitivity was much poorer (0.57 to 0.71), and specificity remained fairly high (0.72 to 0.95) in that review (Gaynes 2005). For patients with major or minor depression, screening statistics were reported for the EPDS, BDI, PDSS, and Center for Epidemiologic Studies Depression Scale (CES-D). Specificity estimates remained relatively high, but sensitivity results were much lower (ranging from 0.43 to 0.71) than for major depression alone, indicating missed cases for this broader depression category. Again, no particular screening instrument performed differently from the others. No available comparators were found for primary care populations. The authors concluded that various screening instruments could be used to identify perinatal depression, most accurately major depression, but that clinicians using these needed to be more aware of precision. For major depression alone, point estimates were equivalent to those found in primary care medical settings (Gaynes 2005).

Close Persons Questionnaire (CPQ)

Social support has been measured extensively in epidemiological research and there were a wide range of potential measures available which could have been used in this

study. The Self-administered Social Support Scale, Functional Social Support Questionnaire, Interview Schedule for Social Interaction and Multi Dimensional Perceived Social Support are examples of social support scales measuring both quality and quantity of support, suitable for use in epidemiological surveys. Three of these measures use a structured questionnaire but do not examine negative aspects of support. The shortened version of the Interview Schedule for Social Interaction measures adequacy of support, but, as with two other questionnaires, does not identify sources of support, while the Self-administered Social Support Scale identifies sources of support but does not differentiate between types of support. The CPQ combines these different aspects of support in one instrument, including emotional/confiding, practical and negative aspects of support from up to four sources of support in a structured questionnaire format as well as measuring social networks. In addition the CPQ, as conventionally applied, is flexible enough to allow respondents to nominate their close persons rather than being restricted to particular roles. Respondents are thereby expected to choose to include those who provide most support within the four close persons. As described in B.2.4, an *a priori* decision for this study was to focus on three key relationships and specify these for CPQ sub-scale administration. This was made on the basis of the anticipated social relationships of most salience for Turkish women of this age, accepting the departure from normal CPQ practice. Furthermore, it was felt to be most appropriate to focus on the quality of these key relationships rather than to attempt a quantitative synthesis of the wider social environment, accepting the fact that the influence other potentially important relationships (e.g. potentially buffering effects of close friendships outside the family) were not captured.

Guide for Monitoring Child Development (GMCD)

The GMCD is a new scale for monitoring child development by introducing a practical method of using an open-ended interviewing technique to obtain comprehensive information about the child's developmental functioning. It is designed specifically for use by health care providers in low- and middle-income (LAMI) countries. Brevity of the training, administration, and scoring and the single sheet instrument offer a practical approach to developmental monitoring. It monitors children aged 0 to 24 months (Ertem et al., 2008).

In high-income countries, there are different instruments which are standardized and validated for developmental monitoring and the early detection of developmental difficulties. However, in LAMI countries, research on child development is extremely limited. Instruments such as the Ten Questions Questionnaire (Durkin et al., 1995), Access Portfolio (Wirtz et al., 2005) and Disability Screening Schedule (Chopra et al., 1999) are the examples of scales using in developed countries. These scales are designed to question caregivers about whether a child has a severe disability and do not provide a framework for monitoring the development of young children. The Denver test (Frankenburg et al., 1992) is one of the most used scales around the world, which relies on "child testing" and "structured questions," both of which are not ideal in LAMI country settings. Furthermore, the Denver II test is less commonly used in the West than it was previously because of research demonstrating its inadequate screening accuracy (Ertem et al., 2008).

It has been recognised that children in LAMI countries have much higher risks of health-related problems that increase the likelihood of developmental delay. Because of that, the WHO recommends using "prescriptive samples" to construct standards (Ertem

et al., 2008). The WHO International Growth Standards and the WHO Motor Development Study (Wijnhoven et al., 2004) have shown that, when child health is homogeneous and optimal, child growth and motor development are similar across diverse countries. The “prescriptive sample” approach enables LAMI countries to have standards for child development that are independent of major health-related risk factors for child development, more comparable between countries, and similar to those of Western children. When healthy subjects are recruited, the sample may be skewed toward children whose caregivers have higher educational levels than national averages (Ertem et al., 2008).

D.3 Cross-sectional associations between social support and antenatal depression

Throughout the 20th century, Turkey has experienced substantial demographic, socio-cultural and economic transformations. These changes have been said to be linked with adverse consequences such as poverty, unemployment, limited social services, and an imbalance in income distribution (Rebuplic of Turkey 2000, WHO 1997). A particularly important potential consequence of population expansion and trans-national and rural-urban migration has been the disruption of traditional family-based support structures common in Middle Eastern, as well as other societies. Taken together, these changes can be supposed to have an important impact on maternal health in perinatal period that could be mediated through loss of traditional support networks. Factors contributing to perinatal depression in Turkey have, in general, been found to be similar to those in other countries. Golbası et al. (2009) found a moderate negative correlation between depression and perceived social support using the Multidimensional Scale of Perceived Social Support, as well as positive correlations with maternal age, gravidity and number of living children.

In this study, the prevalence of antenatal depression was 33% which, as can be seen from section A.8.1 is comparable to findings in other Turkish postnatal samples using this scale and cut-off (Golbasi et al., 2009, Karacam et al., 2009) , although higher than findings from other countries (Rahman et al., 2003, Glavin et al., 2009, Grussu and Quatraro 2009): in particular, higher than the 12% postnatal prevalence reported in a systematic review of studies undertaken mostly in developed countries (Bennet et al., 2004). One possible explanation is that this represents differences in scale performance – for example in its cross-cultural validity in Turkey. However, as described in section

B.2.4, scaling statistics for Turkish samples have not been markedly different from those seen in other lower prevalence settings (Kirpinar et al., 2010). Using an EPDS cut-off of ≥13, Kirpinar et al (2010) reported 84% and 88% sensitivity and specificity respectively against known diagnosis, with Cronbach's alpha scores at one and six weeks postpartum of 0.85, 0.86, respectively. Evans et al., (2001) reported similar sensitivity (86%) and specificity (78%) using same cut-off in their UK sample. Furthermore, the baseline sample, as previously argued, was likely to be representative of its source population, reducing the likelihood of sampling bias. Inequalities in underlying national or regional risk therefore do need further consideration. Prevalence data on mental disorders in Middle Eastern and comparable nations are relatively few but those studies that have been carried out have suggested markedly higher levels than those commonly seen in Western settings – for example a 12-month prevalence of any DSM-IV disorder of 17% in Lebanon with mood disorders twice as prevalent in women compared to men (and anxiety disorders seven times as prevalent (Karam et al., 2006)), or a 27% prevalence of major depressive disorder in a large community study of adults aged 15 years and above in Morocco (Kadri et al., 2010; with 34% prevalence in women). Clearly further research is required into cross-cultural variation in mental disorder prevalence and the extent to which this can be assessed with equivalence across world regions. However, given the prospective findings in this cohort of high levels of persistence for this particular depression category and associations with deterioration in important social relationships, the findings do suggest a level of morbidity that is both common and impactful.

Findings from this study show similarities and dissimilarities compared to other studies in terms of potential risk factors for antenatal depression. Social support, life events,

violence were associated with depression whereas age, education level and income were not (Gausia et al., 2009). A number of socio-demographic risk factors have been identified for depression during pregnancy, including younger age and lower education (Lovisi et al., 2005). Increased parity and lack of support, particularly poor support from the partner/husband have also been associated with depression in both developed and developing countries (Patel et al., 2002). In particular, physical abuse by intimate partners before or during pregnancy has been found to be a particularly important potential risk factor for antenatal depression (Lovisi et al., 2005).

The relationship between women and their mother and mother in-law is still important in Turkish culture, whether the woman is living in a nuclear or extended family setting. A woman in a traditional setting will typically move to live with her husband and his family in the same house when she gets married. In this setting, the expected role of a woman's own mother is to support this marriage by helping her daughter on practical issues (e.g. taking care of children) and emotional issues. To the candidate's knowledge, this is the first study which has assessed the association between antenatal depression and support from the mother and mother in-law, although this has been investigated previously for postnatal depression in Turkey (Inandi et al., 2005). In the sample reported here, there were strong associations between depression and nearly all measures of social support from the three relatives in question. Those with the husband and mother-in-law were particularly strong, consistent with the importance of these figures in women's lives in this culture. The only exception was that negative aspects of the relationship with the mother were more strongly associated with depression than those with the mother-in-law. This might possibly reflect a long-standing poor parental relationship prior to marriage but with lasting effects on mental health.

Turkey in general, and Ankara in particular, offers important advantages for research into the role of different family structures because of the longstanding co-existence of 'Western' and traditional 'Middle Eastern' cultures and it was therefore investigated whether an extended family setting might modify potential effects of spousal and other key relationships on depression risk, specifically anticipating that the presence of other family members might reduce the impact of a poor quality spousal relationship. Contrary to the study hypothesis, effect modification, where found, was in the opposite direction with stronger cross-sectional associations between spousal support and antenatal depression in traditional families, particularly with respect to lower emotional support. Prospective analyses showed no effect modification by family structure on social support as a risk factor for incidence or persistence of depression. On the other hand, analyses of antenatal depression as a risk factor for decline in social support (C.3, and as discussed later), found stronger effects on spousal support in traditional family settings. Therefore effect modification, if present, may principally concern an adverse influence of depression on the spousal relationship. This might possibly reflect a higher visibility of marital difficulties in extended families, or possibly assumptions about the role of the woman's mental health in the marital context which would require further in-depth research, probably qualitative, to investigate further. In secondary analyses of baseline analyses (C.1), effect modification by previous children was also investigated; the stronger association in women without previous children might reflect a buffering effect of other children on the impact of marital strain or possibly higher feelings of empowerment in this group of women and/or the presence of children allowing greater access to friends and extra-familial support networks. Also of interest was the observation that the association with social support from the mother-in-law was equally

strong in nuclear and traditional families, emphasising the importance of this relationship in Turkish culture, and with implications for future clinical and public health interventions. The association with support from the mother was, as mentioned, weaker in most respects, and the observation of possibly opposite associations with daughters' depression between traditional and nuclear families might reflect differing roles of the mother in the two situations. Higher practical support from the mother in the context of an extended family structure (i.e. for women living with their husband's family) might represent a more severe breakdown of relationships in the household where women are residing. However, as stated earlier, the study had limited power to investigate interactions with family structure and the number of analyses means that individual significant findings should be viewed with caution and as requiring replication.

Support from family members has been found to be an important buffer against depression in women from other low and middle income settings (Broadhead et al., 2001). Some research into perinatal mental disorder in Islamic nation settings has suggested both high prevalence of disorder and a potentially harmful role of disruptions to traditional family structures (Rahman et al., 2003). Although a high prevalence of antenatal depression was found in the sample, consistent with this, there was little evidence that traditional family structures conferred additional protection, either directly or through buffering effects of individual relationships. However, it should be borne in mind that these nuclear and traditional structures have co-existed in Turkey for a long time, potentially allowing individual and societal adjustment. As stated earlier, results cannot necessarily be generalised to nations or cultures undergoing more rapid changes and further research is required in these settings.

D.4 Social support and the incidence and persistence of depression between antenatal and postnatal examinations

In members of the cohort present at the first postnatal examination, incident postnatal depression occurred in 14% of women without antenatal depression, and depression persisted from the antenatal to postnatal period in 50%. It is increasingly recognised that many cases of perinatal depression begin in the antenatal period and persist after childbirth (Patel et al. 2004). Antenatal and postnatal depression have also been reported to share similar prevalences to those for depression in the general population with estimates ranging from 12– 20%, with a commonly reported estimate of 13% (Patel et al. 2004, Dennis 2005, Glasser et al 2000).

The prevalence of postnatal depression, 26%, was comparable to findings in other Turkish postnatal samples using this scale and cut-off, although higher than findings from other countries (Rahman et al 2003, Glavin et al. 2009, Grussu and Quatraro 2009): in particular, higher than the 12% prevalence reported, as mentioned in section D.3, by a systematic review of studies undertaken in developed countries in all but one instance (Bennet et al. 2004). The same considerations apply as discussed in section D.3 concerning cross-cultural applicability of the scale or underlying differences in risk.

Because of difficulties in conducting longitudinal studies in the perinatal period, evidence on the incidence of PND is limited (Banti et al 2011). The incidence of depression in postnatal period has been reported as ranging from 7-20% as described in Chapter A.4, 6.8 %, 9.8 %, 14.5 % and 20.1 % in studies from different time of assessment in postnatal period in different countries (Table A. 3). The incidence of

postnatal depression in this sample is similar to that reported by Areias et al (1996) in whose sample 15 % had a new episode during the first 3 months after childbirth. The persistence of perinatal depression is also similar to findings in Iran (Kheirabadi and Maracy 2010) which was 49.6% although is higher compared to the 43.7% reported for a British study (Heron et al. 2004).

According to a review by Robertson et al (2004), strong predictors of postnatal depression include depression during pregnancy and a recent stressful life event, with lower perceived social support also a risk factor. Stressful life events were associated with both incidence and persistence of depression in the cohort described here, consistent with this, although this exposure was not the focus for the analysis and its independence from other exposures was not assessed. In unadjusted analyses, lower income predicted incidence but not persistence of depression. Otherwise, no other covariates were associated with incidence or persistence, although two or more previous children, worse reported physical health and past emotional problems had been found to be significantly associated with depression at baseline, as previously reported (Senturk et al, 2011).

Strong associations had been found at baseline between antenatal depression and lower emotional support from the husband and the mother-in-law. In these prospective analyses, these findings were confirmed for persistence and incidence of depression respectively. On the other hand no predictive associations were found for practical support or negative aspects of the relationships. While this might simply reflect different psychometric properties between the subscales, it would also be consistent with expectations in Turkish society, where practical support is more to be expected

from close relatives and where both lack of practical support and negative aspects of a relationship may be more clearly seen as something which can be discussed with other friends or family members. The stronger and more consistent associations with support from the mother-in-law compared to the mother (both observed in cross-sectional associations with antenatal depression and with prospective data here) may reflect the relative importance of the former relationship for women in Turkish society, or it is possible that the perceived relationship with the mother-in-law is more strongly linked with the quality of a woman's marriage. Finally, it could reflect reluctance on the part of participants to report problems with parental relationships, particularly emotional relationships. Support from family members has been found to be an important buffer against depression in women from other low and middle income settings (Broadhead 2001), and some research into perinatal mental disorder in Islamic nation settings has suggested both high prevalence of disorder and a potentially harmful role of disruptions to traditional family structures (Rahman et al 2003).

Different associations with incidence and persistence of depression might simply reflect type 1 statistical error which should be borne in mind given the number of analyses. However, the individual associations (with emotional support from the spouse/mother-in-law) are consistent with baseline cross-sectional associations and suggest that the latter may reflect different actions in relation to prevalence. In panel surveys of older community populations, several studies have found different predictors of incidence and persistence of depression – for example physical ill health primarily predicting incidence and social support primarily predicting persistence (Prince et al., 1998). Findings here suggest that the relationship with the mother-in-law may preferentially affect a woman's risk of developing depression in the post-natal period, possibly

reflecting alterations in family dynamics following childbirth. For women who are depressed in the ante-natal period, on the other hand, the quality of the relationship with their husband appears to be the most salient factor in predicting recovery or not after childbirth.

No difference had been found at baseline in the prevalence of antenatal depression between traditional and nuclear family settings and the findings of similar incidence and persistence rates are consistent with this. At baseline, emotional support from the husband had been found to be more strongly associated with antenatal depression in traditional compared to nuclear family settings but no significant interactions with family structure were found for depression incidence or persistence in these prospective analyses. Although statistical power was limited, in general the findings suggest that the importance of the family environment remains consistent across different family structures, to the extent that these could be characterised and quantified in this setting. While it is the candidate's belief that they represent considerable heterogeneity in experience within this setting, it is possible that there are societal norms and expectations in Turkey which transcend these structural differences (for example pertaining to the importance of the mother-in-law relationship even where there is no co-residence).

D.5 The association between antenatal depression and subsequent social support

Depression is recognised to have a range of potential adverse impacts on well-being. For example, the impact of depression and other mental disorders on health outcomes has been highlighted as a major priority for international research, including not only direct effects on health but also more indirect effects on access to and engagement with treatment regimes. (Prince et al., 2007). Symptom profiles, disability and quality of life associated with depression have also received substantial attention. While a negative effect of depression on social relations has high plausibility, there has been little research on this, the vast majority of prospective studies investigating the opposite direction of association – i.e. lower social support as a risk factor for depression.

A longitudinal study of a large Canadian community sample found reciprocal relationships between major depression and low social support: the strongest and most robust findings were for low support as a risk factor for depression; however, depression also predicted the emergence of low 'affection social support' (i.e. derived from items rating demonstrable evidence of affection, potential overlapping with the SDQ emotional support construct), although not other aspects of support (Patten et al., 2010). A smaller study comparing 49 people assessed before and after a first depression episode to 351 never-depressed controls, the cases described an increase in levels of interpersonal dependency and deterioration in social skills; however, the authors did not feel that the overall differences were substantial or robust (Rohde et al., 1990). A study in Finland following 193 people with major depressive disorder over an 18 month period found an improvement in subjective support associated with clinical recovery but no improvement in objective support; both outcomes deteriorated in persistent cases

(Leskela et al., 2008). Studies investigating so called 'scar effects' of depression (i.e. persisting negative psychological change after symptomatic resolution) have tended not to find evidence for this (Beevers et al., 2007, Zeiss and Lewinsolm 1988). Instead the concept of 'erosive effects' (depression-induced changes in perceptions of social support leading to counterproductive behaviours such as the seeking of reassurance and/or negative feedback) has been suggested as a more plausible hypothesis (Joiner 2000).

The findings from this study therefore have some consistency with those in other related areas of enquiry, although to the candidate's knowledge, the effect of depression on social support or relationship quality has not been investigated to date in a perinatal cohort. Lower social support has been reported as a strong to moderate risk factor for postnatal depression (Robertson 2005) and moderate risk factor antenatal depression (Lancaster et al., 2010) in recent two meta-analyses. The findings here however strongly suggest a reciprocal relationship with an overall decline in several aspects of social support in the cohort as a whole which was more marked in participants with antenatal depression at baseline. The fact that associations with depression were most marked for emotional support rather than other aspects, and most marked for support from the husband and mother-in-law rather than the mother, is consistent with the findings for the analyses reported earlier (i.e. as correlates and predictors of depression). These may well reflect the salience of emotional over other aspects of support in relation to participants' mental health, and the salience of the two relationships in the particular family contexts sampled in this study, as discussed earlier. Antenatal depression was also associated with an exaggerated decline in subsequent practical support from the mother-in-law, although the independence of this association from that with change in

emotional support was not investigated as the two are likely to be strongly related constructs. A traditional family structure, as previously discussed, appeared to increase the impact of depression on the spousal relationship but did not apparently modify the impact on the mother-in-law relationship. An important consideration is that, although attempts were made to adjust for a range of potential confounding factors, it is not possible to infer with certainty whether the exaggerated decline in self-rated support represented a consequence of the antenatal depressive episode or whether both reflected ongoing or emerging poor relationships preceding the depression. Absolute clarification of this issue however would require research over a much longer period, ideally from a point preceding first pregnancies or possibly even the marriage itself. Regression to the mean is not a valid explanation, since levels of support were already relatively low at baseline in participants with depression and this process would have obscured rather than exaggerated associations with subsequent decline.

D. 6 Perinatal depression and child development

Research on maternal depression has focused primarily on postpartum effects on mother-infant interactions with much less attention given to antenatal depression. Few longitudinal studies which start in antenatal period and continue to postnatal period have investigated the association between antenatal and postnatal depression and child development (Gerardin et al. 2011). (Table A.5) This thesis reports findings from a large community-based sample that was followed up for a mean period of 20 months. Depression was ascertained in an identical manner at all four examination points using a standard instrument and cut-off whose screening properties have been discussed earlier and which is likely to be effective in identifying groups with significant morbidity, supported by the associations with declining social support described in the previous section. Taking these advantages into account, the candidate feels that the findings are robust with respect to absent associations with child development at the final examination, insofar as this was quantified. The study hypothesis of a negative impact of depression on child development was therefore not supported.

Comparison is difficult because few studies have been undertaken on prospectively collected antenatal depression data. Of those that have, one UK cohort study found association with antenatal depression and children's development after adjusting for postpartum depression (Deave et al., 2008); however, the association between antenatal depression and child development in that study was at borderline significance (using EPDS≥10, p=0.047, EPDS≥13, p=0.043). The results of the study reported here are consistent with other studies that found no associations between postpartum depression and child development (Murray 1992, Hay et al 1995). The features of the sample

should be considered. On the one hand, a large community sample was followed that, as argued earlier, is likely to be broadly representative of its source population; on the other hand the exclusion of preterm delivery might have led to underestimated associations: although the incidence of preterm delivery was low (10%) in this study, associations have been reported with antenatal depression in other samples (Grote et al., 2010). Child assessment was based on maternal report and trained interviewer observation using the GMCD which, as discussed, has been supported as suitable for use in low- and middle-income settings. There remains the possibility of residual confounding, although it is difficult to envisage a factor that is both a negative confounder and with a sufficiently powerful influence to obscure a meaningful association. The nature of the outcome should be considered – i.e. mean levels of development in an unselected community sample – and it is important to bear in mind that the study was not powered to compare the risk of rarer more specific outcomes such as the incidence of severe developmental delay. Paternal depression has been suggested to influence child development (Ramchandani et al 2005), but the mental state of other family members was not evaluated in this study.

In a review, Grace (2003) concluded that the strongest effects of postnatal depression appear to be on development of cognitive abilities such as language, intelligence, and Piaget's object concept tasks. However, these effects were found to be quite heterogeneous and potentially related to contextual factors and the child's sex. If there are adverse effects of postnatal on child development it has been suggested that these are mediated through maternal interpersonal behaviour and sex of the infant. The impact is likely to be worse where the depressive episode is severe and prolonged, and the negative effects of postnatal depression may occur in conjunction with parental conflict

and low socioeconomic status (Grace et al., 2003). Moreover, the findings in a recent review (Brand and Brennen 2009) suggest that exposure during the postpartum period might have limited predictive ability on its own. It seems that continued exposure to maternal symptoms across infancy and early childhood might be a stronger predictor of child outcome than exposure occurring only during the postpartum period. Parenting factors, exposure to stressful life events, and other concomitant risk factors are important predictors for long-term outcomes in these children (Brand and Brennen 2009)..

Several studies report a link between antenatal depression and later child development (i.e. beyond that examined in this study), in particular a more difficult temperament (Gerardin et al. 2011). However, it is less clear whether postnatal depression leads to cognitive delay in children unless it is prolonged or severe (Deave et al 2008). Furthermore, postnatal depression may be either a factor on the causal pathway between antenatal depression and child development, or it may act as an independent influence (Deave et al 2008). One review concluded that perinatal exposure to maternal depression and perinatal exposure to maternal stress/anxiety have differential impacts on child outcomes, with the strongest and most consistent negative effects on child outcomes associated with antenatal anxiety and stress (Brand and Brennen 2009). However, in considering lower birth weight as an outcome, a recent study concluded that comorbid anxiety, depression, sleep problems, and pain were difficult to distinguish as predictors (Field et al 2010). Additionally, children of depressed mothers may inherit directly a vulnerability to depression. However, although some research in this area has suggested evidence for a relationship between symptoms of perinatal maternal mental

illness and child outcome measures, it has been emphasised that no study to date has demonstrated a causal relationship between these factors (Brand and Brennen 2009).

D. 7 Implications

Implications arising from the findings discussed above will now be considered. General implications for public health, clinical practice and research will be discussed, followed by specific issues for perinatal depression in Turkey and directions for future research.

Implications for clinical practice and public health

It is well-established that perinatal depression is prevalent in most countries around the world and is probably as prevalent if not more so outside Western settings, where most research has focused to date, despite the existence of traditional postpartum rituals and strong social supportive mechanisms in more traditional societies such as those found in Middle Eastern countries. It is important that health care professionals are aware of this phenomenon and ensure that their services provide effective interventions in a timely fashion. As there may be a lack of mental health staff in many countries, provision of training for midwives and community nurses to screen and deal with antenatal and postnatal is pivotal to perinatal depression care. Interventions may be classified under primary, secondary, and tertiary prevention categories.

Primary prevention interventions include indentifying risk factors associated with perinatal depression in the target populations and delivering appropriate preventive measures. As an example, family planning and counselling services may decrease unwanted/unplanned pregnancy (Ekuklu et al., 2004).

Secondary prevention interventions encompass early detection and treatments of the disabling depressive symptoms. Routine screening for perinatal depression by using a self-reported questionnaire during pregnancy and postpartum periods may be indicated.

Finally, tertiary prevention interventions entail preventing relapses of depressive symptoms. Routine follow-up and home health visits during the pregnancy and postpartum periods are strongly recommended.

Considering the specific findings of this study, the high prevalence of antenatal depression and its appreciably high persistence into the postnatal period emphasise the importance of applying evidence-based intervention strategies in Turkey under the broad headings outlined above. The prospective findings relating to effects on social relationships suggest that the measure and cut-off applied to define depression, although broad and defining a sizeable proportion of the sample, are nevertheless capturing a group at risk of adverse consequences. The reciprocal associations found with social support measures suggest that this interface should be considered as an important potential target for intervention. These could entail anything from a greater awareness of family dynamics and tensions at the point of assessment and/or screening to consideration of family-orientated interventions at the point of treatment, not only to improve recovery (of relevance being the association between lower emotional support from the husband and depression maintenance described in section C.2). Public education programmes might also be considered in relation to improving awareness of depression and the family context with a view to prevention (of relevance being the association between lower emotional support from the mother-in-law and risk of depression onset), and further consideration should be given to preventing an adverse

impact of depression on social relationships – for example, by increasing education about the condition and attempting to reduce any associated stigma. Given the observed prospective associations between worse relationship quality and risk of depression incidence/maintenance, it seems reasonable to assume that interventions to improve social support during and after one pregnancy might reduce the risk of depression in later similar circumstances.

Implications for research

Clearly there are a number of areas which require further research in a more general context relating to perinatal mental health: for example, further exploration of the role of physical/biological and cultural factors. As well as longitudinal studies of large representative samples, more qualitative data are also needed to elaborate women's lived experiences during the postpartum period. Additionally, randomised-controlled trails are required to test the effectiveness of culturally sensitive interventions developed for women with perinatal depression in Middle Eastern and other Asian cultures. Internationally collaborative studies are also likely to be increasingly informative.

As discussed earlier, there are several limitations to the current body of evidence. First of all, there is significant heterogeneity among studies, including differences in the screening and case ascertainment instruments that are used, the populations that are studied, the risk factors that are addressed, and the confounders that are controlled for in statistical analyses. Most studies of perinatal depression have been cross-sectional in design, limiting the ability to draw conclusions about the direction of causality. To address these issues, standard and commonly applied measurements were used in a representative sample followed prospectively. However, clearly there would be value in

further investigation of the study hypotheses to clarify whether they can be replicated in other settings, nations and cultures. The uncertain generalisability of 'traditional' as distinct from 'nuclear' family settings in Turkey has been considered previously and understanding would benefit from wider consideration since the Turkish system of long co-existence between 'Eastern' and 'Western' social structures and lifestyles is possibly a unique one. The potential influence of family structure as an effect modifier, particularly concerning the impact of depression on social support, cannot be assumed to generalise to settings where there has been more rapid and recent social transition, and further research here is indicated. The findings of the study with respect to the three key social relationships also require replication and further investigation in other settings as it is likely that family structures and roles vary even within apparently similar 'traditional' settings. In particular, it would be helpful to investigate the prospective interrelationships between social support and depression in other Middle Eastern and Islamic cultures where, to the candidate's knowledge, there has been little previous research.

As well as replicating and extending the described study design in other settings, further observational research would be helpful within the population sampled. Specifically, as mentioned earlier, recruitment at an earlier stage and a longer period of follow-up might help to clarify further the direction of causation between depression and reduced support. Interviews with other family members might also provide a more detailed picture of the interplay between these factors, as might in-depth qualitative interviews. Longer follow-up of child outcomes might also help to increase the accuracy of developmental measures (both through their repetition and through a longer time over which to assess delay) and allow the supplementation of these with wider measures of

emotion and behaviour. Further possible extensions might include expanding the research questions to investigate the influence of the child's status on maternal mental health as well as the extent to which factors measured in this cohort predict antenatal and postnatal depression in subsequent pregnancies.

Finally, it is important that observational findings are translated into interventions and that robust data is generated to provide an appropriate evidence base for these. The most obvious implication for an intervention arising from this study concerns ways of improving social support both generally for mothers or mothers-to-be in this population and specifically for those found to have significant depressive symptoms. Relevant outcomes would include both prevention and treatment of depression and also the prevention of deterioration in social support in mothers generally around childbirth and in those with perinatal depression specifically. Individual-level interventions might include attempts to improve social relationships, or possibly to provide alternative mechanisms of support to increase women's resilience so that relationship strains have less of an influence on their mental health. Wider societal interventions might include public education programmes to improve awareness and reduce stigma, and/or increased availability of support through alterations in health service structures and relevant non-governmental organisations.

REFERENCES

Abbott, M. Williams M. Postnatal depressive symptoms among Pacific mothers in Auckland: prevalence and risk factors. Aust N Z J Psychiatry. 2006 Mar;40(3):230-8.

Affonso D. Predictors of depression symptoms during pregnancy and postpartum. J Psychosom Obstet Gynaecol 1991;12:255.

Affonso DD, De AK, Horowitz JA, Mayberry LJ: An international study exploring levels of postpartum depressive symptomatology. *J Psychosom Res* 2000, 49:207-16.

Akman C, Uguz F, Kaya N Postpartum-onset major depression is associated with personality disorders. Compr Psychiatry. 2007 Jul-Aug;48(4):343-7.

Alati R, Lawlor DA, Najman JM, Williams GM, Bor W, O'Callaghan M. Is there really a 'J-shaped' curve in the association between alcohol consumption and symptoms of depression and anxiety? Findings from the Mater-University Study of Pregnancy and its outcomes. Addiction. 2005;100(5):643-51.

Almond P. Postnatal depression: a global public health perspective. Perspect Public Health. 2009 Sep;129(5):221-7.

Alvik A, Heyerdahl S, Haldorsen T, Lindemann R. Alcohol use before and during pregnancy: a population-based study. Acta Obstet Gynecol Scand. 2006;85(11):1292-8.

American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders IV: Text Revised. American Psychiatric Association, 2000; Washington, D.C.

Andersson L, Sundström-Poromaa I, Wulff M, Aström M, Bixo M. Neonatal outcome following maternal antenatal depression and anxiety: a population-based study. Am J Epidemiol. 2004 May 1;159(9):872-81.

Anoop S, Saravanan B, Joseph A, Cherian A, Jacob KS: Maternal depression and low maternal intelligence as risk factors for malnutrition in children: a community based case-control study from South India**.** *Arch Dis Child* 2004, 89(4):325-329.

Areias ME, Kumar R, Barros H, et al. Comparative incidence of depression in women and men, during pregnancy and after childbirth. Validation of the Edinburgh Postnatal Depression Scale in Portuguese mothers. Br J Psychiatry 1996; 169(1):30-5.

Armstrong DS. Impact of prior perinatal loss on subsequent pregnancies. J Obstet Gynecol Neonatal Nurs. 2004 Nov-Dec;33(6):765-73.

Aydin N, Inandi T, Karabulut N: Depression and associated factors among women within their first postnatal year in Erzurum province in eastern Turkey. *Women's Health* 2005, 41:1- 12.

Ayvaz S, Hocaoğlu C, Tiryaki A, Ak I. Incidence of postpartum depression in Trabzon province and risk factors at gestation Turk Psikiyatri Derg. 2006;17(4):243-51.

Banti S, Mauri M, Oppo A, Borri C, Rambelli C, Ramacciotti D, Montagnani MS, Camilleri V, Cortopassi S, Rucci P, Cassano GB From the third month of pregnancy to 1 year postpartum. Prevalence, incidence, recurrence, and new onset of depression. Results from the Perinatal Depression–Research & Screening Unit study. Comprehensive Psychiatry, 2011;52343–351.

Basraon S, Costantine MM Mood disorders in pregnant women with thyroid dysfunction. Clin Obstet Gynecol. 2011; 54(3):506-14.

Bates DS and Toro PA. Developing measures to assess social support among homeless and poor people. Journal of Community Psychology, 1999; 27(2); 137-156

Bayley, N. *Bayley Scales of Infant Development*. 2nd ed. San Antonio, TX: Psychological Corporation; 1993

Beck CT: The effects of postpartum depression on maternal-infant interaction: A meta-analysis**.** Nurs Res 1995, 44:298-304.

Beck CT. A meta-analysis of predictors of postpartum depression. Nurs Res 1996;45:297–303.

Beck, C. T. A checklist to identify women at risk for developing postpartum depression. J *Obstet* Gynecol *Neonatal Nurs,* 1998, 27,3946.

Beck CT. The effects of postpartum depression on child development: a meta-analysis. Arch Psychiat Nurs, 1998, 12: 12–20.

Beck CT. Predictors of postpartum depression: an update. Nurs Res 2001;50:275–85.

Beeghly M, Weinberg MK, Olson KL, Kernan H, Riley J , Tronick EZ. Stability and change in level of maternal depressive symptomatology during the first postpartum year. Journal of Affective Disorders 71, 2002, 169–180.

Beevers CG, Rohde P, Stice E, Nolen-Hoeksema S. Recovery from major depressive disorder among female adolescents: a prospective test of the scar hypothesis. J Consult Clin Psychol 2007; 75(6): 888-900.

Bennett HA, Einarson A, Taddio A, Koren G, Einarson TR: Prevalence of depression during pregnancy: Systematic review. *Obstet Gynecol* 2004, 103:. 698–709.

Bergner A, Beyer R, Klapp BF, Rauchfuss M. Pregnancy after early pregnancy loss: a prospective study of anxiety, depressive symptomatology and coping. J Psychosom Obstet Gynaecol. 2008 Jun;29(2):105-13.

Berle J, Mykletun A, Daltveit A, Rasmussen S, Holsten F, Dahl A. Neonatal outcomes in offspring of women with anxiety and depression during pregnancy. A linkage study

from the Nord-Trondelag Health Study (HUNT) and Medical Birth Registry of Norway. Arch Womens Ment Health 2005;8:181–9.

Bernazzani O, Saucier JF, David H, Borgeat F. Psychosocial factors related to emotional disturbances during pregnancy. J Psychosom Res. 1997 Apr;42(4):391-402.

Billings AG, Moos RH. Comparisons of children of depressed and nondepressed parents: a social-environmental perspective. J Abnorm Child Psychol. 1983 Dec;11(4):463-85.

Birndorf CA, Madden A, Portera L, Leon AC. Psychiatric symptoms, functional impairment, and receptivity toward mental health treatment among obstetrical patients. Int J Psychiatry Med. 2001;31(4):355-65.

Black MM, Baqui AH, Zaman K, Arifeen SE, Black RE: Maternal depressive symptoms and infant growth in rural Bangladesh**.** *Am J Clin Nutr* 2009, 89(3):951S-957.

Blaney NT, Fernandez MI, Ethier KA, Wilson TE, Walter E, Koenig LJ; Perinatal uidelines Evaluation Project Group. Psychosocial and behavioral correlates of depression among HIV-infected pregnant women. AIDS Patient Care STDS. 2004;18(7):405-15.

Bolton HL, Hughes PM, Turton P, Sedgwick P. Incidence and demographic correlates of depressive symptoms during pregnancy in an inner London population. J Psychosom Obstet Gynaecol. 1998;19(4):202-9.

Bowen A, Muhajarine N. Antenatal depression. Can Nurse. 2006;102(9):26-30

Bowen A, Muhajarine N. Prevalence of antenatal depression in women enrolled in an outreach program in Canada. J Obstet Gynecol Neonatal Nurs. 2006; 35(4):491-8.

Brand SR, Brennan PA. Impact of antenatal and postpartum maternal mental illness: how are the children? Clin Obstet Gynecol. 2009; 52(3):441-55.

Brennan AP, Hammen C, Andersen MJ, Bor W, Najman JM, Williams GM. Chronicity, Severity, and Timing of Maternal Depressive Symptoms: Relationships with Child Outcome at Age 5. Developmental Psychology 2000; 36 (6) 759-766.

Bricker D, Squires J, Mounts L, Potter L, Nickel R, Farrell J. *Ages & Stages Questionnaires (ASQ):A Parent-Completed, Child-Monitoring System*. 2nd ed. Baltimore, MD: Paul H. Brookes; 1995

Broadhead J, Abas M, Khumalo Sakutukwa G, Chigwanda M, Garura E. Social support and life events as risk factors for depression amongst women in an urban setting in Zimbabwe. *Soc Psychiat Psychiatr Epidemiol* 2001, 36:115-22.

Brugha TS, Sharp HM, Cooper SA, et al. The Leicester 500 Project. Social support and the development of postnatal depressive symptoms, a prospective cohort survey. Psychol Med 1998;28:63–79.

Brummelte S, Galea LA. Depression during pregnancy and postpartum: contribution of stress and ovarian hormones. Prog Neuropsychopharmacol Biol Psychiatry 2010 Jun 30;34(5):766-76.

Bugdayci R, Sasmaz CT, Tezcan H, Kurt AO, Oner S. A cross-sectional prevalence study of depression at various times after delivery in Mersin province in Turkey. J Womens Health (Larchmt). 2004 Jan-Feb;13(1):63-8.

Campbell SB, John JF. The timing and chronicity of postpartum depression: implications for infant development. In: Cooper, P.J., editor. Postpartum Depression and Child Development. Guilford; New York: 1997. p. 165-197.

Carter AS, Garrity-Rokous FE, Chazan-Cohen R, Little C, Briggs-Gowan MJ. Maternal depression and comorbidity: predicting early parenting, attachment security, and toddler social-emotional problems and competencies. J Am Acad Child Adolesc Psychiatry. 2001 Jan;40(1):18-26.

Chandran M, Tharyan P, Muliyil J, Abraham S. Post-partum depression in a cohort of women from a rural area ofTamil Nadu, India : Incidence and risk factors. *BJP* 2002, 181:499-504.

Chaudron LH, Klein MH, Remington P, Palta M, Allen C, Essex MJ. Predictors, prodromes and incidence of postpartum depression. J Psychosom Obstet Gynaecol. 2001 Jun;22(2):103-12.

Chee CY, Lee DT, Chong YS, Tan LK, Ng TP, Fones CS. Confinement and other psychosocial factors in perinatal depression: a transcultural study in Singapore. J Affect Disord. 2005 Dec;89(1-3):157-66.

Chibanda D, Mangezi W, Tshimanga M, Woelk G, Rusakaniko P, Stranix- Chibanda L, Midzi S, Maldonado Y, Shetty AK: Validation of the Edinburgh Postnatal Depression Scale among women in a high HIV prevalence area in urban Zimbabwe. *Arch Womens Ment Health* 2009: 16. [Epub ahead of print]

Chopra G, Verma IC, Seetharaman P. Development and assessment of a screening test for detecting childhood disabilities. *Indian J Pediatr.* 1999;66(3):331–335

Christensen AL. Stuart EA, Perry DF, Le HN. Unintended Pregnancy and Perinatal depression Trajectories in Low-Income, High-Risk Hispanic Immigrants. Prev Sci, 2011, 12:289–299

Chung TK, Lau TK, Yip AS, Chiu HF, Lee DT. Antepartum depressive symptomatology is associated with adverse obstetric and neonatal outcomes. Psychosom Med. 2001 Sep-Oct;63(5):830-4.

Cooklin AR, Rowe HJ, Fisher JR. Employee entitlements during pregnancy and maternal psychological well-being. Aust N Z J Obstet Gynaecol. 2007 Dec;47(6):483-90.

Cooper PJ, Campbell EA, Day A, Kennerley H, Bond A. Non-psychotic psychiatric disorder after childbirth. A prospective study of prevalence, incidence, course and nature. Br J Psychiatry. 1988;152:799-806.

Cooper PJ, Murray L. Course and recurrence of postnatal depression—evidence for the specificity of the diagnostic concept. Brit J Psychiat 1995;166:191–195.

Cooper PJ, Murray L. Postnatal depression. BMJ. 1998 Jun 20;316(7148):1884-6

Cooper PJ, Tomlinson M, Swartz L, Woolgar M, Hurray L, Holteno C: Postpartum depression and the mother-infant relationship in a South African peri-urban settlement**.** *British Journal of Psychiatry* 1999, 175:554-558.

Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression: Development of the 10-item Edinburgh Postnatal Depression Scale. British Journal of Psychiatry 1987;150:782-786.

Cox JL, Murray D, Chapman G. A controlled study of the onset, duration and prevalence of postnatal depression. Br J Psychiatry 1993; 163:27-31.

Danaci AE, Dinc G, Deveci A, Sen FS, Icelli I: Postnatal depression in Turkey: epidemiological and cultural aspects. *Soc Psychiat Psychiatr Epidemiol* 2002, 37:125-9.

Da-Silva VA, Moraes-Santos AR, Carvalho MS, Martins ML, Teixeira NA. Prenatal and postnatal depression among low income Brazilian women. Braz J Med Biol Res. 1998 Jun;31(6):799-804.

Da Costa D, Larouche J, Dritsa M, Brender W. Psychosocial correlates of prepartum and postpartum depressed mood. J Affect Disord 2000;59:31-40.

Davey HL, Tough SC, Adair CE, Benzies KM. Risk Factors for Sub-Clinical and Major Postpartum Depression Among a Community Cohort of Canadian Women. Matern Child Health J. Epub 2008 Feb 7.

Dayan J, Creveuil C, Herlicoviez M, Herbel C, Baranger E, Savoye C, Thouin A. Role of anxiety and depression in the onset of spontaneous preterm labor. Am J Epidemiol 2002;155:293–301.

Dayan J, Creveuil C, Marks MN, Conroy S, Herlicoviez M, Dreyfus M, Tordjman S. Prenatal Depression, Prenatal Anxiety, and Spontaneous Preterm Birth: A Prospective Cohort Study Among Women With Early and Regular Care. Psychosomatic Medicine, 2006, 68:938–946.

Deave T, Heron J, Evans J, Emond A. The impact of maternal depression in pregnancy on early child development. BJOG. 2008 Jul;115(8):1043-51

Dennis CL: Psychosocial and psychological interventions for prevention of postnatal depression: systematic review. *BMJ* 2005, 331:15.

Dennis CL. The effect of peer support on postpartum depression: A pilot randomized controlled trial. Can J Psychiatry 2003; 48(2):115-24.

Dennis CL, Ross LE, Herxheimer A. Oestrogens and progestins for preventing and treating postpartum depression. Cochrane Database Syst Rev. 2008 Oct 8;(4):CD001690.

Dindar I, Erdogan S. Screening of Turkish women for postpartum depression within the first postnatal year: The risk profile of a community sample. Public Health Nursing, 2007, 24(2), 176–183.

Di Pietro JA, Novak MF, Costigan KA, Atella LD, Reusing SP. Maternal psychological distress during pregnancy in relation to child development at age two. Child Dev. 2006 May-Jun;77(3):573-87.

Durkin MS, Hasan ZM, Hasan KZ. The ten questions screen for childhood disabilities: its uses and limitations in Pakistan. *J Epidemiol Community Health.* 1995;49(4):431–436

Edge D, Baker D, Rogers A. Perinatal depression among black Caribbean women. Health and Social Care in the Community 2004, 12 (5), 430–438.

Ege E, Timur S, Zincir H, Geckil E, Sunar-Reeder B. Social support and symptoms of postpartum depression among new mothers in Eastern Turkey. Journal of Obstetrics and Gynecology Research 2008; (4), 585–593.

Ekuklu G, Tokuc B, Eskiocak M, Berberoglu U, Saltık A: Prevalence of postpartum depression in Edirne, Turkey, and related factors. *J Reprod Med* 2004, 49:908-14.

Elsenbruch S, Benson S, Rücke M, Rose M, Dudenhausen J, Pincus-Knackstedt MK, Klapp BF, Arck PC. Social support during pregnancy: effects on maternal depressive symptoms, smoking and pregnancy outcome. Human Reproduction 2007, .22, No.3 pp. 869–877.

Engindeniz AN, Kuey L, Kultur S: Edinburgh doğum sonrası depresyon olceği Turkce formu gecerlilik ve guvenilirlik calısması. Bahar Sempozyumları 1 Kitabı, 1996, Psikiyatri Derneği Yayınları, Ankara, 51-52.

EPI DATA A comprehensive tool for validated entry and documentation of data. [program]**.** 3rd edition. Odense, Denmark: The Epidata Association; 2003.

Ertel KA, Koenen KC, Rich-Edwards JW, Gillman MW. Antenatal and postpartum depressive symptoms are differentially associated with early childhood weight and adiposity. *Paediatric and Perinatal Epidemiology* 2010; **24:** 179–189.

Evans J, Heron J, Francomb H, Oke S, Golding J. Cohort study of depressed mood during pregnancy and after childbirth BMJ 2001, 323, 257-60.

Evans J, Heron J, Patel RR, Wiles N. Depressive symptoms during pregnancy and low birth weight at term: longitudinal study. Br J Psychiatry. 2007; 191:84-5.

Evans J, Melotti R, Heron J, Ramchandani P, Wiles N, Murray L, Stein A. The timing of maternal depressive symptoms and child cognitive development: a longitudinal study. J Child Psychol Psychiatry. 2011 Dec 23. [Epub ahead of print].

Ertem IO, Dogan DG, Gok CG, Kizilates SU, Caliskan A, Atay G, Vatandas N, Karaaslan T, Baskan SG, Cicchetti DV A guide for monitoring child development in low- and middle- income countries. Pediatrics. 2008; 121(3):e581-9.

Felice E, Saliba J, Grech V, Cox J. Prevalence rates and psychosocial characteristics associated with depression in pregnancy and postpartum in Maltese women. J Affect Disord. 2004; 15;82(2):297-301.

Field T, Diego M, Hernandez-Reif M, Figueiredo B, Deeds O, Ascencio A, Schanberg S, Kuhn C. Comorbid Depression and Anxiety Effects on Pregnancy and Neonatal Outcome. *Infant Behav Dev*. 2010; 33(1): 23.

Flynn HA, Walton MA, Chermack ST, Cunningham RM, Marcus SM. Brief detection and co-occurrence of violence, depression and alcohol risk in prenatal care settings. Arch Womens Ment Health. 2007; 10(4):155-61.

Ford E, Ayers S. Stressful events and support during birth: the effect on anxiety, mood and perceived control. J Anxiety Disord. 2009; 23(2):260-8.

Forman DN, Videbech P, Hedegaard M, Salvig JD, Secher NJ. Postpartum depression: identification of women at risk. Br J Obstet 2000;107(10):1210-7.

Fortner RT, Pekow P, Dole N, Markenson G, Chasan-Taber L. Risk factors for prenatal depressive symptoms among Hispanic women. Matern Child Health J. 2011;15(8):1287- 95.

Franche RL, Mikail SF. The impact of perinatal loss on adjustment to subsequent pregnancy. Soc Sci Med. 1999; 48(11):1613-23.

Frazier PA, Tix AP, Barron KE. Testing Moderator and Mediator Effects in Counseling Psychology Research. Journal of Counseling Psychology, 2004; 51(1); 115–134

Frankenburg WK, Dodds J, Archer P, Shapiro H, Bresnick B. The Denver II: a major revision and restandardization of the Denver Developmental Screening Test. *Pediatrics.* 1992;89(1): 91–97.

Galler JR, Bryce CP, Waber D, Hock RS, Exner N, Eaglesfield D, Fitzmaurice G, Harrison R. Early childhood malnutrition predicts depressive symptoms at ages 11-17. J Child Psychol Psychiatry. 2010 Jul;51(7):789-98.

Gausia K, Fisher C, Ali M, Oosthuizen J: Antenatal depression and suicidal ideation among rural Bangladeshi women: a community-based study. *Arch Womens Ment Health*. 2009, 12(5):351-8.

Gavin N, Gaynes B, Lohr K, Meltzer-Brody S, Gartlehner G, Swinson T. Perinatal depression: a A Systematic Review of Prevalence and Incidence. Obstetrics and Gynecology, 2005, 106 (5):1071-83.

Gavin AR, Holzman C, Siefert K, Tian Y. Maternal Depressive Symptoms, Depression and Psychiatric Medication Use in Relation to Risk of Preterm Delivery. *Womens Health Issues*. 2009; 19(5): 325–334.

Gayness BN, Gavin NI, Meltzer-Brody S, Lohr KN, SwinsonT, Gartlehner G, Brody S, Miller WC. Perinatal Depression: Prevalence, Screening Accuracy, and Screening Outcomes. Evidence Report/Technology Assessment, 2005, Number 119.

Geçkil E, Sahin T, Ege E. Traditional postpartum practices of women and infants and the factors influencing such practices in South Eastern Turkey. Midwifery. 2009 Feb;25(1):62-71.

Gerardin P, Wendland J, Bodeau N, Galin A, Bialobos S, Tordjman S, Mazet P, Darbois Y, Nizard J, Dommergues M, Cohen D. Depression During Pregnancy: Is the Developmental Impact Earlier on Boys? A Prospective Case-Control Study. J Clin Psychiatry 2011, 72(3):378-387.

Gibson J, McKenzie-McHarg K, Shakespeare J, Price J, Gray R: A systematic review of studies validating the Edinburgh Postnatal Depression Scale in antepartum and postpartum women. Acta Psychiatr Scand 2009, 119: 350–364.

Glascoe FP. Technical Manual for the Brigance Screening Tests. North Billerica, MA: Curriculum Associates, Inc; 1996.

Glasser S, Barell V, Boyko V, Ziv A, Lusky A, Shoham A, Hart S: Postpartum depression in an Israeli cohort: demographic, psychosocial and medical risk factors. *J Psychosom Obstet Gynaecol* 2000, 21:99–108.

Glasser S, Tanous M, Shihab S, Goldman N, Ziv A, Kaplan G. Perinatal Depressive Symptoms Among Arab Women in Northern Israel. Matern Child Health J 2011 (Epub head)

Glavin K, Smith L, Sørum R: Prevalence of postpartum depression in two municipalities in Norway. *Scand J Caring Sci*. 2009, 23(4); 705-10.

Glazier RH, Elgar FJ, Goel V, Holzapfel S. Stress, social support, and emotional distress in a community sample of pregnant women. J Psychosom Obstet Gynaecol. 2004 Sep-Dec;25(3-4):247-55.

Goh I, Low LF, Brodaty H. Levels and rates of depression among Chinese people living in Chinese ethno-specific and mainstream residential care in Sydney. Int Psychogeriatr. 2010 Mar;22(2):237-45. Epub 2009 Aug 10.

Golbasi Z, Kelleci M, Kisacik G, Cetin A. Prevalence and correlates of depression in pregnancy among Turkish women. Matern Child Health J. 2010 Jul;14(4):485-91. Epub 2009 Feb 24.

Goldbort J. Transculturel analysis of postpartum depression. MCN, 2006, 31(2):121-6.

Golding J, Pembrey M, Jones R; ALSPAC Study Team. ALSPAC- Avon Longitudinal Study of Parents and Children. I Study methodology. Paediatr Perinat Epidemiol. 2001 Jan;15(1):74-87.

Goodman JH. Postpartum Depression Beyond the Early Postpartum Period JOGNN 2004, 33(4):410-20.

Gotlib IH, Whiffen VE, Mount JH, et al. Prevalence rates and demographic characteristics associated with depression in pregnancy and the postpartum. J Consult Clin Psychol 1989; 57(2):269-74.

Gotlieb BH, Bergen AE. Social support concepts and measures. Journal of Psychosomatic Research 69 (2010) 511–520.

Grace SL, Evindar A, Stewart DE. The effect of postpartum depression on child cognitive development and behavior: a review and critical analysis of the literature. Archive of Women's Mental Health. 2003; 6:263–274.

Grant KA, McMahon C, Austin MP. Maternal anxiety during the transition to parenthood: a prospective study. J Affect Disord. 2008 May;108(1-2):101-11.

Groër M, Davis M, Casey K, Short B, Smith K, Groër S. Neuroendocrine & immune relationships in postpartum fatigue. *MCN: The American Journal of Maternal/Child Nursing,* 2005, *30*(2), 133-138.

Groer MW, Morgan K. Immune, health and endocrine characteristics of depressed postpartum mothers. Psychoneuroendocrinology. 2007 Feb;32(2):133-9.

Grote V, Torstein Vik2,3, Rüdiger von Kries1, Veronica Luque4, Jerzy Socha5, Elvira Verduci6, Clotilde Carlier7, Berthold Koletzko. Maternal postnatal depression and child growth: a European cohort study. BMC Pediatrics 2010, 10:14

Grussu P, Quatraro RM: Prevalence and risk factors for a high level of postnatal depression symptomatology in Italian women: a sample drawn from ante-natal classes. Eur Psychiatry. 2009, 24(5):327-33.

Gulseren L, Erol A, Gulseren S, Kuey L, Kilic B, Ergor G. From antepartum to postpartum: a prospective study on the prevalence of peripartum depression in a semiurban Turkish community. J Reprod Med. 2006 Dec;51(12):955-60.

Gürel S, Gürel H. The evaluation of determinants of early postpartum low mood: the importance of parity and inter-pregnancy interval. Eur J Obstet Gynecol Reprod Biol. 2000 Jul;91(1):21-4.

Halbreich, U. Postpartum disorders: multiple interacting underlying mechanisms and risk factors. *J. Affect.* 2005; 88(1):1-7.

Halbreich, U., Karkun, S. Cross-cultural and social diversity of prevalence of postpartum depression and depressive symptoms. Journal of Affective Disorders 2006; 91 (2), 97–11.

Hanlon C, Medhin G, Alem A, Araya M, Abdulahi A, Tomlinson M, Hughes M, Patel V, Dewey M, Prince M. Sociocultural practices in Ethiopia: association with onset and persistence of postnatal common mental disorders. Br J Psychiatry. 2010 Dec;197(6):468-75.

Hanlon C, Medhin G, Alem A, Tesfaye F, Lakew Z, Worku B, Dewey M, Araya M, Abdulahi A, Hughes M, *et al.*: Impact of antenatal common mental disorders upon perinatal outcomes in Ethiopia: the P-MaMiE population-based cohort study**.** *Trop Med Int Health* 2009, 14(2):156-166.

Hay DF, Kumar R. Interpreting the effects of mothers' postnatal depression on children's intelligence: a critique and re-analysis. Child Psychiatry Hum Dev 1995;253:165–81.

Hay DF, Pawlby S, Waters CS, Perra O, Sharp D. Mothers' antenatal depression and their children's antisocial outcomes. Child Dev 2010; 81: 149–65.

=Heaman M. Stressful life events, social support, and mood disturbance in hospitalized and non-hospitalized women with pregnancy-induced hypertension. Can J Nurs Res. 1992 Spring;24(1):23-37.

=Henderson A. Safe prescribing practices in pregnancy and lactation. J Midwifery Womens Health. 2003 Mar-Apr;48(2):162.

=Heron J, O'Connor TG, Evans J, Golding J, Glover V: The course of anxiety and depression through pregnancy and the postpartum in a community sample. *J Affective Dis* 2004, 80:65-73.

=Hobfoll SE, Ritter C, Lavin J, Hulsizer MR, Cameron RP. Depression prevalence and incidence among inner-city pregnant and postpartum women. J Consult Clin Psychol 1995;63: 445-53.

=Hoffman S, Hatch MC. Depressive symptomatology during pregnancy: evidence for an association with decreased fetal growth in pregnancies of lower social class women. Health Psychol. 2000 Nov;19(6):535-43.

Holzman C, Eyster J, Tiedje LB, Roman LA, Seagull E, Rahbar MH. A life course perspective on depressive symptoms in mid-pregnancy. Matern Child Health J 2006;10:127- 38.

House JS. Understanding social factors and inequalities in health: 20th century progress and 21st century prospects. J. Health Soc. Behav 2002, 43, 125–142.

http://www.saglik.gov.tr

Inandi T, Elci OC, Ozturk A, Egri M, Polat A, Sahin TK : Risk factors for depression in the first postnatal year, in eastern Turkey. Int J Epidemiol 2002, 31:1201-7.

Inandi T, Bugdayci R, Dundar P, Sumer H, Tasmaz T: Risk factors for depression in the first postnatal year: a Turkish study. Soc Psychiat Psychiatr Epidemiol 2005, 40:725-30.

Jadresic E, Araya R. Prevalence of postpartum depression and associated factors in Santiago, Chile. Rev Med Chil. 1995 Jun;123(6):694-9.

Jesse DE, Seaver W, Wallace DC. Maternal psychosocial risks predict pretermbirth in a group of women fromAppalachia. Midwifery, 2003, 19, 191-202.

Jesse DE, Walcott-McQuigg J, Mariella A, Swanson MS. Risks and protective factors associated with symptoms of depression in lowincome African American and Caucasian women during pregnancy. J Midwifery Womens Health 2005;50:405-10.

Jesse DE, Swanson MS. Risks and resources associated with antepartum risk for depression among rural southern women. Nurs Res. 2007 Nov-Dec;56(6):378-86.

Johanson R, Chapman G, Murray D, Johnson I, Cox J. The North Staffordshire Maternity Hospital prospective study of pregnancy-associated depression. J Psychosom Obstet Gynaecol. 2000 Jun;21(2):93-7.

Joiner TE. Depression's vicious scree: Self-propogating and erosive processes in depression chronicity. Clin Psychol Sci Pract 2000; 150: 720-7.

Josefsson A, Berg G, Nordin C, Sydsjö G. Prevalence of depressive symptoms in late pregnancy and postpartum. Acta Obstet Gynecol Scand. 2001;80(3):251-5.

Josefsson A, Sydsjö G. A follow-up study of postpartum depressed women: recurrent maternal depressive symptoms and child behavior after four years. Arch Womens Ment Health. 2007;10(4):141-5.

Kaaya SF, Mbwambo JK, Kilonzo GP, Van Den Borne H, Leshabari MT, Fawzi MC, Schaalma H. Socio-economic and partner relationship factors associated with antenatal depressive morbidity among pregnant women in Dar es Salaam, Tanzania. Tanzan J Health Res. 2010 Jan;12(1):23-35.

Kadri N, Agoub M, Assouab F, Tazi MA, Didouh A, Stewart R, Paes M, Toufiq J, Moussaoui D. Moroccan national study on prevalence of mental disorders: a community-based epidemiological study. Acta Psychiatr Scand. 2010 Jan;121(1):71-4.

Kamysheva E, Skouteris H, Wertheim EH, Paxton SJ, Milgrom J. A prospective investigation of the relationships among sleep quality, physical symptoms, and depressive symptoms during pregnancy. J Affect Disord. 2010 Jun;123(1-3):317-20.

Kara B, Unalan P, Cifçili S, Cebeci DS, Sarper N. Is there a role for the family and close community to help reduce the risk of postpartum depression in new mothers? A cross-sectional study of Turkish women. Matern Child Health J. 2008 Mar;12(2):155-61. Epub 2007 Jun 6.

Karacam Z, Ancel G. Depression, anxiety and influencing factors in pregnancy: a study in a Turkish population. Midwifery (2009) 25, 344–356

Karam EG, Mneimneh ZN, Karam AN et al. Prevalence and treatment of mental disorders in Lebanon: a national epidemiological survey. Lancet 2006;367:1000-6

Kelly RH, Russo J, Katon W. Somatic complaints among pregnant women cared for in obstetrics: normal pregnancy or depressive and anxiety symptom amplification revisited? Gen Hosp Psychiatry. 2001 May-Jun;23(3):107-13.

Kessler RC, Berglund P, Demler O, Koretz D, Merikangas KR, Rush AJ, Walters EE, Wang PS. The epidemiology of major depressive disorder. Results from the National Comorbidity Survey Replication (NCS-R).). JAMA 2003;289:3095–105.

Kheirabadi GR, Maracy MR. Perinatal depression in a cohort study on Iranian women. J Res Med Sci. 2010 Jan-Feb; 15(1): 41–49.

King NM, Chambers J, O'Donnell K, Jayaweera SR, Williamson C, Glover VA. Anxiety, depression and saliva cortisol in women with a medical disorder during pregnancy. Arch Womens Ment Health. 2010 Aug;13(4):339-45.

Kinsella MT, Monk C. Impact of Maternal Stress, Depression and Anxiety on Fetal Neurobahavioral Development. Clinical Obstetrics and Gynaecology Volume 52, Number 3, 425–440

Kirpinar I, Gözüm S, Pasinlioğlu T. Prospective study of postpartum depression in eastern Turkey prevalence, socio-demographic and obstetric correlates, prenatal anxiety and early awareness. J Clin Nurs. 2010 Feb;19(3-4):422-31.

Kitamura T, Shima S, Sugawara M, et al. Psychological and social correlates of the onset of affective disorders among pregnant women. Psychol Med 1993; 23:967-75.

Kitamura T, Sugawara M, Shima S, et al. Temporal Improved validity of repeated use of Zung's Self- Rating Depression Scale among women during the perinatal period. J Psychosom Obstet Gynecol 1999; 20(2):112-7.

Kitamura T, Yoshida K, Okano T, Kinoshita K, Hayashi M, Toyoda N, Ito M, Kudo N, Tada K, Kanazawa K, Sakumoto K, Satoh S, Furukawa T, Nakano H Multicentre prospective study of perinatal depression in Japan: incidence and correlates of antenatal and postnatal depression Arch Womens Ment Health, 2006, 9: 121–130.

Klainin P, Arthur DG. Postpartum depression in Asian cultures: a literature review. Int J Nurs Stud. 2009 Oct;46(10):1355-73

Korhonen M, Luoma I, Salmelin R, Tamminen T. A longitudinal study of maternal prenatal, postnatal and concurrent depressive symptoms and adolescent well-being. Journal of Affective Disorders, 2011, Epub ahead.

Kurki T, Hiilesmaa V, Raitasalo R, Mattila H, Ylikorkala O. Depression and anxiety in early pregnancy and risk for preeclampsia. Obstet Gynecol. 2000 Apr;95(4):487-90.

Kurstjens S, Wolke D. Effects of maternal depression on cognitive development of children over the first 7 years of life. J Child Psychol Psychiatry. 2001 Jul;42(5):623-36.

Kumar R, Robson KM. A prospective study of emotional disorders in childbearing women. Br J Psychiatry 1984; 144:35-47.

Kumar R. Postnatal mental illness: a transcultural perspective. Social Psychiatry and Psychiatric Epidemiology, 1994, 29, 250–264.

Lancaster CA, Gold KJ, Flynn HA, Yoo H, Marcus SM, Davis MM. Risk factors for depressive symptoms during pregnancy: a systematic review. Am J Obstet Gynecol. 2010 Jan;202 (1):5-14.

Larsson C, Sydsjö G, Josefsson A. Health, sociodemographic data, and pregnancy outcome in women with antepartum depressive symptoms. Obstet Gynecol 2004;104:459-66.

Lawrence E, Nylen K, Cobb RJ. Prenatal expectations and marital satisfaction over the transition to parenthood. Journal of Family Psychology, 2007, 21(2), 155–164.

Lau Y, Wong FWD. Correlates of depressive symptomatology during the second trimester of pregnancy among Hong Kong Chinese. Social Science & Medicine, 2007, 64(9), 1802–1811.

Lau Y, Wong DFK, Chan KS. The utility of screening for perinatal depression in the second trimester among Chinese: A three-wave prospective longitudinal study. Archives of Women's Mental Health, 2010, 13, 153–164.

Lau Y. A Longitudinal Study of Family Conflicts, Social Support, and Antenatal Depressive
Symptoms Among Chinese Women Archives of Psychiatric Nursing, Vol. 25, No. 3 (June), 2011: pp 206–219.

Leathers SJ, Kelley MA. Unintended pregnancy and depressive symptoms among first time mothers and fathers. Am J Orthopsychiatry 2000;70:523-31.

Lee DTS, Yip ASK, Leung TYS, Chung THK. Identifying women at risk of postnatal depression: prospective longitudinal study. HKMJ Vol 6 No 4 December 2000, 349-54

Lee D T, Ngai IS, Ng MM, Lok IH, Yip AS, Chung TK. Antenatal taboos among Chinese women in Hong Kong. Midwifery, 2009, 25(2), 104–113.

Lee D, Yip A, Chiu H, et al. Screening for postnatal depression using the double-test strategy. Psychosom Med 2000; 62(2):258-63.

Lee D, Yip A, Chiu H, Leung T, Chung T. A psychiatric epidemiological study of postpartum Chinese women. Am J Psychiatry 2001; 158(2):220-6

Lee MS, Lee HY, Kang SG, Yang J, Ahn H, Rhee M, Ko YH, Joe SH, Jung IK, Kim SH. Variables influencing antidepressant medication adherence for treating outpatients with depressive disorders. J Affect Disord. 2010 Jun;123(1-3):216-21.

Leigh, B., Milgrom, J. Risk factors for antenatal depression, postnatal depression and parenting stress. BMC Psychiatry, 2008, 8(24), 1–11.

Leskelä U, Melartin T, Rytsälä H, Sokero P, Lestelä-Mielonen P, Isometsä E. The influence of major depressive disorder on objective and subjective social support: a prospective study. J Nerv Ment Dis. 2008 Dec;196(12):876-83.

Leung SS, Martinson IM, Arthur D. Postpartum depression and related psychosocial variables in Hong Kong Chinese women: findings from a prospective study. Res Nurs Health. 2005;28:27–38.

Li D, Liu L, Odouli R. Presence of depressive symptoms during early pregnancy and the risk of preterm delivery: A prospective cohort study. Human Reproduction 2008;24:146–153.

Logsdon M, Usui W, Birkimer J, McBride A. Journal of Nursing Measurement,1996, 4(2), 129–142.

Logsdon MC, Usui WM, Nering M. Validation of Edinburgh postnatal depression scale for adolescent mothers. *Arch Womens Ment Health* 2009, 12(6):433-40.

Lovisi GM, López JR, Coutinho ES, Patel V: Poverty, violence and depression during pregnancy: a survey of mothers attending a public hospital in Brazil. *Psychol Med* 2005, 35(10):1485-92.

Luoma I, Tamminen T, Kaukonen P, Laippala P, Puura K, Salmelin R, Almqvist F. Longitudinal study of maternal depressive symptoms and child well-being. J Am Acad Child Adolesc Psychiatry. 2001 Dec;40(12):1367-74.

Luoma I, Kaukonen P, Mantymaa M, Puura K, Tamminen T, A Longitudinal Study of Maternal Depressive Symptoms, Negative Expectations and Perceptions of Child Problems. Child Psychiatry and Human Development, 2004, 35(1), 37-53.

Mann R., Gilbody S., Adamson J. Prevalence and incidence of postnatal depression: what can systematic reviews tell us? Arch Womens Ment Health, 2010, 13:295–305

Manzolli P, Nunes MA, Schmidt MI, Pinheiro AP, Soares RM, Giacomello A, Drehmer M, Buss C, Hoffmann JF, Ozcariz S, Melere C, Manenti CN, Camey S, Ferri CP. Violence and depressive symptoms during pregnancy: a primary care study in Brazil. Soc Psychiatry Psychiatr Epidemiol. 2010; 45(10):983-8.

Marcus SM, Flynn HA, Blow FC, Barry KL. Depressive symptoms among pregnant women screened in obstetrics settings. J Womens Health (Larchmt) 2003;12(4):373–380.

Marmorstein NR, Malone SM, Iacono WG. Psychiatric disorders among offspring of depressed mothers: associations with paternal psychopathology. Am J Psychiatry 2004; 161(9):1588-94.

Matthey S, Barnett B, Ungerer J, Waters B. Paternal and maternal depressed mood during the transition to parenthood. J Affect Disord. 2000 Nov;60(2):75-85.

McGrath JM, Records K, Rice M. Maternal depression and infant temperament characteristics. Infant Behav Dev. 2008 Jan;31(1):71-80.

Mckee MD, Cunningham M, Jankowski KR, Zayas L. Health-related functional status in pregnancy: relationship to depression and social support in a multi-ethnic population. Obstet Gynecol. 2001 Jun;97(6):988-93.

Medhin G, Hanlon C, Dewey M, Alem A, Tesfaye F, Lakew Z, Worku B, Aray M, Abdulahi A, Tomlinson M, Hughes M, Patel V, Prince M. The effect of common mental disorders on infant undernutrition in Butajira, Ethiopia: The P-MaMiE study. *BMC Psychiatry* 2010, **10**:32

Meltzer-Brody S. New insights into perinatal depression: pathogenesis and treatment during pregnancy and postpartum. Dialogues Clin Neurosci. 2011;13(1):89-100.

Miller LJ. Comprehensive care of pregnant mentally ill women. J Ment Health Adm. 1992;19(2):170-7.

Miller LJ. Postpartum depression. JAMA, 2002, 287; 6: 762-5.

Mills EP, Finchilescu G, Lea SJ. Postnatal depression: an examination of psychological factors. S Afr Med J, 1995;85:99–105.

Morse CA, Buist A, Durkin S. First-time parenthood: influences on pre- and postnatal adjustment in fathers and mothers. J Psychosom Obstet Gynaecol 2000;21:109-20.

Moss KM, Skouteris H, Wertheim EH, Paxton SJ, Milgrom J. Depressive and anxiety symptoms through late pregnancy and the first year post birth: an examination of prospective relationships. Arch Womens Ment Health. 2009 Oct;12(5):345-9.

Murray L. The impact of postnatal depression on infant development. J Child Psychol Psychiatry 1992;33:543–61.

Murray L, Cooper P. Effects of postnatal depression on infant development. Arch Dis Child. 1997 Aug;77(2):99-101.

Najman J.M, Andersen M.J. Bor W. Postnatal depression-myth and reality: maternal depression before and after the birth of a child. Soc. Psychiatry Psychiatr. Epidemiol. 2000;35:19– 27.

National Health and Medical Research Council. Postnatal depression- a systemic review of published scientific literature to 1999. NHMRC: 2000, AusInfo, Canberra.

National Institute of Mental Health www.nimh.nih.gov/**health/**publications/

Nemeroff CB. Recent advances in the neurobiology of depression. Psychopharmacol Bull. 2002 Summer;36 Suppl 2:6-23.

Nemeroff CB. Understanding the pathophysiology of postpartum depression: implications for the development of novel treatments. Neuron. 2008 Jul 31;59(2):185-6.

Norbeck JS, Tilden VP. Life stress, social support, and emotional disequilibrium in complications of pregnancy: a prospective, multivariate study. J Health Soc Behav. 1983 Mar;24(1):30-46.

Oates MR, Cox JL, Neema S, Asten P, Glangeaud-Freudenthal N, Figueiredo B, Gorman LL, Hacking S, Hirst E, Kammerer MH, Klier CM, Seneviratne G, Smith M, Sutter-Dallay AL, Valoriani V, Wickberg B, Yoshida K; TCS-PND Group. Postnatal depression across countries and cultures: a qualitative study. Br J Psychiatry Suppl; 2004, 46:10-6.

O'Connor TG, Heron J, Golding J, Beveridge M, Glover V. Maternal antenatal anxiety and children's behavioural/emotional problems at 4 years. Report from the Avon Longitudinal Study of Parents and Children. Br J Psychiatry 2002; 180: 502–8.

O'Hara MW, Neunaber DJ, Zekoski EM. Prospective study of postpartum depression: Prevalence, course, and predictive factors. J Abnorm Psychol 1984; 93(2):158-71.

O'Hara MW, Swain AM. Rates and risk of postpartum depression—a meta-analysis. Int Rev Psychiatry 1996;8:37–54.

O'Heron CA. Coping and postpartum depression: an analysis of coping and depression during pregnancy and the puerperium. J Affect Dis 2000; 60: 75-85;

Okun ML, Luther J, Prather AA, Perel JM, Wisniewski S, Wisner KL. Changes in sleep quality, but not hormones predict time to postpartum depression recurrence. J Affect Disord. 2011 May;130(3):378-84.

Orr S, Miller C. Maternal depressive symptoms and the risk of poor pregnancy outcome. Review of the literature and preliminary findings. Epidemiological Reviews 1995;17:165–171.

Ozbaşaran F, Coban A, Kucuk M. Prevalence and risk factors concerning postpartum depression among women within early postnatal periods in Turkey. Arch Gynecol Obstet. 2011 Mar;283(3):483-90.

Pajulo M, Savonlahti E, Sourander A, Helenius H, Piha J. Antenatal depression, substance dependency and social support. J Affect Disord. 2001;65(1):9-17.

Parsons CE, Young KS, Rochat TJ, Kringelbach ML, Stein A. Postnatal depression and its effects on child development: a review of evidence from low- and middle-income countries. Br Med Bull. 2011 Dec 3. [Epub ahead of print]

Patel V, Araya R, Lima MS, Ludermir A, Todd C: Women, poverty and common mental disorders in four restructuring societies. *Soc Sci Med* 1999, 491:461–471.

Patel V, Rodrigues M, DeSouza N: Gender, poverty, and postnatal depression: a study of mothers in Goa, India. *Am J Psychiatry* 2002, 159(1):43-7.

Patel V, DeSouza N, Rodrigues M: Postnatal depression and infant growth and development in low income countries: a cohort study from Goa, India**.** *Arch Dis Child* 2003, 88(1):34-37.

Patel V, Rahman A, Hughes M: Effect of maternal health on infant growth in low income countries: new evidence from South Asia. *BMJ* 2004, 328:820-823.

Patel V, Prince M: Maternal psychological morbidity and low birth weight in India**.** *Br J Psychiatry* 2006, 188:284-285.

Patten SB. Williams JWA, Lavorato DH, Bulloch AGM. Reciprocal Effects of Social Support in Major Depression Epidemiology. *Clinical Practice & Epidemiology in Mental Health,* 2010, *6,* 126-131.

Pawlby S, Hay D, Sharp D, Waters CS, Pariante CM. Antenatal depression and offspring psychopathology: the influence of childhood maltreatment. *BJP* 2011, 199:106-112.

Perry DF, Ettinger AK, Mendelson T, Le HN. Prenatal depression predicts postpartum maternal attachment in low-income Latina mothers with infants. Infant Behav Dev. 2011 Apr;34(2):339-50.

Pignone MP, Gaynes BN, Rushton JL, et al. Screening for depression in adults: a summary of the evidence for the US Preventive Services Task Force. Ann Intern Med 2002; 136(10):765-76.

Plews C, Bryar R, Closs J. Clients' perceptions of support received from health visitors during home visits. Journal of Clinical Nursing, 2005, 14(7), 789–797.

Posmontier B. Horowitz JA. Postpartum Practices and Depression Prevalences: Technocentric and Ethnokinship Cultural Perspectives. *J Transcult Nurs* 2004 15: 34-43.

Pottinger AM, Trotman-Edwards H, Younger N. Detecting depression during pregnancy and associated lifestyle practices and concerns among women in a hospital-based obstetric clinic in Jamaica. Gen Hosp Psychiatry. 2009 May-Jun;31(3):254-61.

Prince MJ, Harwood RH, Thomas A, Mann AH. , Psychological Medicine, 1998, 28: 337-50.

Prince M, Patel V, Saxena S, Maj M, Maselko J, Phillips MR, Rahman A. No health without mental health. Lancet. 2007 Sep 8;370(9590):859-77.

Rahman A, Harrington R, Bunn J. Can maternal depression increase infant risk of illness and growth impairment in developing countries? Child Care Health Dev. 2002;28:51-56.

Rahman A, Iqbal Z, Harrington R: Life events, social support and depression in childbirth: perspectives from a rural community in the developing world. *Psychol Med* 2003, 33(7):1161–1167.

Rahman A, Iqbal Z, Bunn J, Lovel H, Harrington R: Impact of maternal depression on infant nutritional status and illness: a cohort study**.** *Arch Gen Psychiatry* 2004, 61(9):946-952.

Rahman A, Lovel H, Bunn J, Iqbal Z, Harrington R: Mothers' mental health and infant growth: A case-control study from Rawalpindi, Pakistan**.** *Child: Care, Health & Development* 2004, 30(1):21-27.

Rahman A, Creed F. Outcome of prenatal depression and risk factors associated with persistence in the first postnatal year: Prospective study from Rawalpindi, Pakistan. *J Affect Disord*. 2007 June ; 100(1-3): 115–121.

Rahman A, Bunn J, Lovel H, Creed F: Maternal depression increases infant risk of diarrhoeal illness: a cohort study**.** *Arch Dis Child* 2007, 92(1):24-28.

Ramchandani P, Stein A, Evans J, O'Connor TG; ALSPAC study team. Paternal depression in the postnatal period and child development: a prospective population study. Lancet. 2005 Jun 25-Jul 1;365(9478):2201-5.

Raymond JE. 'Creating a safety net': Women's experiences of antenatal depression and their identification of helpful community support and services during pregnancy. Midwifery, 2009, 5(1), 39–49.

Republic of Turkey, Prime Ministry. State institute of statistics. Population census, Ankara. 2002.

Republic of Turkey, Prime Ministry. State planning organization. The project of East Anatolia, Ankara. 2000.

Records K, Rice M. Psychosocial correlates of depression symptoms during the third trimester of pregnancy. J Obstet Gynecol Neonatal Nurs 2007;36:231-42.

Ritter C, Hobfoll SE, Lavin J, Cameron RP, Hulsizer MR. Stress, psychosocial resources, and depressive symptomatology during pregnancy in low-income, inner-city women. Health Psychol 2000;19:576-85.

Robertson, E., Grace, S., Wallington, T., and Stewart, D. Antenatal risk factors for postpartum depression: a synthesis of recent literature. *Gen. Hosp. Psychiatry* 2004, **26,** 289–295.

Rodriguez MA, Heilemann MV, Fielder E, Ang A, Nevarez F, Mangione CM. Intimate partner violence, depression, and PTSD among pregnant Latina women. Ann Fam Med 2008;6:44-52.

Rohde P, Lewinsohn PM, Seeley JR. Are people changed by the experience of having an episode of depression? A further test of the scar hypothesis. J Abnorm Psychol. 1990 Aug;99(3):264-71.

Ross LE, Dennis CL. The prevalence of postpartum depression among women with substance use, an abuse history, or chronic illness: a systematic review. J Womens Health. 2009;18(4):475-86.

Ross J, Hanlon C, Medhin G, Alem A, Tesfaye F, Worku B, Dewey M, Patel V, Prince M. Perinatal mental distress and infant morbidity in Ethiopia: a cohort study. *Arch Dis Child Fetal Neonatal Ed* 2011;96:F59–F64

Rubertsson C. Wickberg B. Gustavsson P. Depressive symptoms in early pregnancy, two months and one year postpartum-prevalence and psychosocial risk factors in a national Swedish sample. Arch. Women. Ment. Health 2005;8:97–104.

Rubio DM, Kraemer KL, Farrell MH, Day NL. Factors associated with alcohol use, depression, and their co-occurrence during pregnancy. Alcohol Clin Exp Res. 2008 Sep;32(9):1543-51.

Ryan D, Milis L, Misri N. Depression during pregnancy. Can Fam Physician. 2005 Aug;51:1087-93.

Sabuncuoğlu O, Berkem M. Relationship between attachment style and depressive symptoms in postpartum women: findings from Turkey. Turk Psikiyatri Derg. 2006 Winter;17(4):252-8.

Salamero M, Marcos T, Gutiérrez F, Rebull E. Factorial study of the BDI in pregnant women. Psychol Med. 1994;24(4):1031-5.

Santos IS, Matijasevich A, Domingues MR, Barros AJD, Barros FCF. Long-Lasting Maternal Depression and Child Growth at 4 Years of Age: A Cohort Study. *Pediatr*. 2010; 157(3-3): 401–406.

Sawyer A, Ayers S, Smith H. Pre- and postnatal psychological wellbeing in Africa: a systematic review. J Affect Disord. 2010 Jun;123(1-3):17-29.

Sayil M, Güre A, Uçanok Z. First time mothers' anxiety and depressive symptoms across the transition to motherhood: associations with maternal and environmental characteristics. Women Health. 2006;44(3):61-77.

Scottish Intercollegiate Guidelines Network 2002 www.nice.org.uk/.../developingniceclinicalguidelines/

Scrandis DA, Sheikh TM, Niazi R, Tonelli LH, Postolache TT. Depression after Delivery: Risk Factors, Diagnostic and Therapeutic Considerations. *TheScientificWorldJOURNAL (2007) 7, 1670–1682.*

Seguin L, Potvin L, St-Denis M, Loiselle J. Chronic stressors, social support, and depression during pregnancy. Obstet Gynecol 1995;85:583-9.

Séguin L, Potvin L, St-Denis M, Loiselle J. Socio-environmental factors and postnatal depressive symptomatology: a longitudinal study. Women Health. 1999;29(1):57-72.

Senturk V, Abas M, Berksun O, Stewart R. Social support and antenatal depression in extended and nuclear family environments in Turkey: a cross-sectional survey. BMC Psychiatry. 2011 Mar 24;11:48.

Shaw E, Levitt C, Wong S, Kaczorowski J; McMaster University Postpartum Research Group. Systematic review of the literature on postpartum care: effectiveness of postpartum support to improve maternal parenting, mental health, quality of life, and physical health. Birth. 2006 Sep;33(3):210-20.

Skouteris H, Wertheim EH, Germano C, Paxton SJ, Milgrom J. Assessing sleep during pregnancy: a study across two time points examining the Pittsburgh Sleep Quality Index and associations with depressive symptoms. Womens Health Issues. 2009 Jan-Feb;19(1):45-51.

Smith MV, Shao L, Howell H, Wang H, Poschman K, Yonkers KA. Success of mental health referral among pregnant and postpartum women with psychiatric distress. Gen Hosp Psychiatry. 2009 Mar-Apr;31(2):155-62.

Söderquist J, Wijma K, Wijma B. Traumatic stress in late pregnancy. J Anxiety Disord 2004;18:127

Sparrow SS, Cicchetti DV. Diagnostic uses of the Vineland Adaptive Behavior Scales. J Pediatr Psychol. 1985 Jun;10(2):215-25.

Spoozak, L., Gotman, N., Smith, M. V., Belanger, K., & Yonkers, K. A. (2009). Evaluation of a social support measure that may indicate risk of depression during pregnancy. Journal of Affective Disorders, 114, 216–223.

Stansfeld S, Marmot M: Deriving a survey measure of social support: the reliability and validity of the Close Persons Questionnaire**.** *Soc Sci Med* 1992, 35:1027-35.

Steiner M. Postnatal depression: a few simple questions Fam Pract. 2002 Oct;19(5):469-70.

Stewart RC: Maternal depression and infant growth: a review of recent evidence**.** *Maternal and Child Nutrition* 2007, 3(2):94-107.

Stice E, Ragan J, Randall P. Prospective relations between social support and depression: differential direction of effects for parent and peer support? J Abnorm Psychol. 2004 Feb;113(1):155-9.

Stuchbery M, Matthey S, Barnett B. Postnatal depression and social supports in Vietnamese, Arabic and Anglo-Celtic mothers. Social Psychiatry and Psychiatric Epidemiology; 1998, 33: 483–490.

Sutter-Dallay AL, Murray L, Dequae-Merchadou L, Glatigny-Dallay E, Bourgeois ML, Verdoux H. A prospective longitudinal study of the impact of early postnatal vs. chronic maternal depressive symptoms on child development. European Psychiatry, 2011, 26;484–489.

Talge NM, Neal C, Glover V; Early Stress, Translational Research and Prevention Science Network: Fetal and Neonatal Experience on Child and Adolescent Mental Health. Antenatal maternal stress and long-term effects on child neurodevelopment: how and why? J Child Psychol Psychiatry. 2007 Mar-Apr;48(3-4):245-61.

Tezel A, Gozum S: Comparison of effects of nursing care to problem solving training on levels of depressive symptoms in postpartum women. Patient Education and Counselling 2006, 63(1-2):64-73.

Thurtle V. Post-natal depression: the relevance of sociological approaches. *Journal of Advanced Nursing,* 1995, Z2,416-424

Tilden VP. The relation of selected psychosocial variables to single status of adult women during pregnancy. Nurs Res. 1984 Mar-Apr;33(2):102-7.

Tomlinson M, Cooper P, Murray L: The mother-infant relationship and infant attachment in a South African peri-urban settlement**.** *Child Dev* 2005, 76(5):1044-1054.

Tomlinson M, Cooper PJ, Stein A, Swartz L, Molteno C: Post-partum depression and infant growth in a South African peri-urban settlement**.** Child: Care, Health and Development 2006, 32(1):81-86.

Tronick E, Reck C. Infants of depressed mothers. Harv Rev Psychiatry. 2009;17(2):147-56.

Uguz F, Akman C, Sahingoz M, Kaya N, Kucur R. One year follow-up of post-partum-onset depression: the role of depressive symptom severity and personality disorders. Journal of Psychosomatic Obstetrics & Gynecology, June 2009; 30(2): 141–145.

Unalan T. Turkey's population at the beginning of the 21st century. Nufusbil Derg. 1997;19:57-72.

U.S. Preventive Services Task Force. Screening for depression: recommendations and rationale. Ann Intern Med 2002; 136(10): 760-4.

Vander Weg MW, Ward KD, Scarinci IC, Read MC, Evans CB. Smoking-related correlates of depressive symptoms in low-income pregnant women. Am J Health Behav 2004;28:510-21.

Verdoux H, Sutter AL, Glatigny-Dallay E, Minisini A. Obstetrical complications and the development of post-partum depressive symptoms: a prospective survey of the MATQUID cohort. Acta Psychiatr Scand 2002;106:212–21.

Villegas L, McKay K, Dennis CL, Ross LE. Postpartum depression among rural women from developed and developing countries: a systematic review. J Rural Health. 2011 Summer;27(3):278-88.

Viswesvaran, C., Sanchez, J.I., Fisher, J., 1999. The role of social support in the process of work stress: A meta-analysis. Journal of Vocational Behavior 54, 314–334.

Vivilaki VG, Dafermos V, Kogevinas M, Bitsios P, Lionis C: The Edinburgh Postnatal Depression Scale: translation and validation for a Greek sample. *BMCPublic Health* 2009, 9:9:329.

Wadhwa PD. Psychoneuroendocrine processes in human pregnancy influence fetal development and health. Psychoneuroendocrinology. 2005 Sep;30(8):724-43.

Walker LO, Grobe SJ. The construct of thriving in pregnancy and postpartum. Nurs Sci Q. 1999 Apr;12(2):151-7.

Wang, S., Chen, C., Psychosocial health of Taiwanese postnatal husbands and wives. Journal of Psychosomatic Research 2006; 60 (3), 303–307.

Warner R, Appleby L, Whitton A, Faragher B. Demographic and obstetric risk factors for postnatal psychiatric morbidity. Br J Psychiatry 1996;168:607–11.

Warren PL, McCarthy G, Corcoran P. Postnatal Depression in First-Time Mothers: Prevalence and Relationships Between Functional and Structural Social Support at 6 and 12 Weeks Postpartum. Archives of Psychiatric Nursing, 2011, 25 (3): pp 174–184.

Watson JP, Elliott SA, Rugg AJ, Brough DI. Psychiatric disorder in pregnancy and the first postnatal year. Br J Psychiatry 1984; 144:453-62.

Westdahl C, Milan S, Magriples U, Kershaw TS, Rising SS, Ickovics JR. Social support and social conflict as predictors of prenatal depression. Obstet Gynecol 2007;110:134-40.

Whitson SM, El-Sheikh M. Moderators of family conflict and children's adjustment and health. Journal of Emotional Abuse, 2003, 3(1 & 2), 47–73.

Wijnhoven TM, de Onis M, Onyango AW, et al. Assessment of gross motor development in the WHO Multicentre Growth Reference Study. *Food Nutr Bull.* 2004;25(suppl 1):S37–S45

Wills TA, Fegan MF. Social networks and social support. In A. Baum, T. A. Revenson & J. E. Singer (Eds.), Handbook of health psychology. New Jersey, 2001. Mahwah: Lawrence Erlbaum Associates.

Wirtz S, Edwards K, Flower J, Yousafzai A. Field testing of the ACCESS materials: a portfolio of materials to assist health workers to identify children with disabilities and offer simple advice to mothers. *Int J Rehabil Res.* 2005;28(4):293–302

Wojcicki JM, Holbrook K, Lustig RH, Epel E, Caughey AB, Muñoz RF, Shiboski SC, Heyman MB. Chronic maternal depression is associated with reduced weight gain in latino infants from birth to 2 years of age. PLoS One. 2011 Feb 23;6(2).

World Health Organization: Nations for mental health—a focus on women. *WHO* 1997, Geneva 1–5.

World Health Organisation 2000 World Health Organization Women's mental health: an evidence based review. WHO, 2000, Geneva, 31–44.

Wu J, Viguera A, Riley L, Cohen L, Ecker J. Mood disturbance in pregnancy and the mode of delivery. Am J Obstet Gynecol. 2002;187(4):864-7.

Xie RH, Gouping HE, Koszycki D, Walker M, Wen SW. Prenatal Social Support, Postnatal Social Support, and Postpartum Depression. Annals of Epidemiology, 2009; 19 (9): 637-43.

Xie RH, Yang J, Liao S, Xie H, Walker M, Wen SW. Prenatal family support, postnatal family support and postpartum depression. Australian and New Zealand Journal of Obstetrics and Gynaecology 2010; 50: 340–345.

Yagmur Y, Ulukoca N. Social support and postpartum depression in low-socioeconomic level postpartum women in Eastern Turkey. Int J Public Health, 2010, 55:543–549.

Yalçin SS, Orün E, Mutlu B, Madendağ Y, Sinici I, Dursun A, Ozkara HA, Ustünyurt Z, Kutluk S, Yurdakök K. Paediatr Perinat Epidemiol. Why are they having infant colic? A nested case-control study. 2010 Nov;24(6):584-96.

Yamashita H, Yoshida K, Nakano H, Tashiro N. Postnatal depression in Japanese women. Detecting the early onset of postnatal depression by closely monitoring the postpartum mood. J Affect Disord 2000; 58(2):145-54.

Yoshida K, Marks M, Kibe N, Kumar R, Nakano H, Tashiro N. Postnatal depression in Japanese women who have given birth in England. J Affect Disord 1997; 43(1):69-77.

Zayas LH, Cunningham M, McKee MD, Jankowski KR. Depression and negative life events among pregnant African-American and Hispanic women. Womens Health Issues. 2002 Jan-Feb;12(1):16-22.

Zeiss AM, Lewinsohn PM. Enduring deficits after remissions of depression: a test of the scar hypothesis. Behav Res Ther 1988; 26(2): 151-8.

Zelkowitz P, Schinazi J, Katofsky L, et al. Factors associated with depression in pregnant immigrant women. Transcultural Psychiatry 2004;41:445-64.

Zuckerman B, Amaro H, Bauchner H, Cabral H. Depressive symptoms during pregnancy: relationship to poor health behaviors. Am J Obstet Gynecol 1989;160:1107-11.